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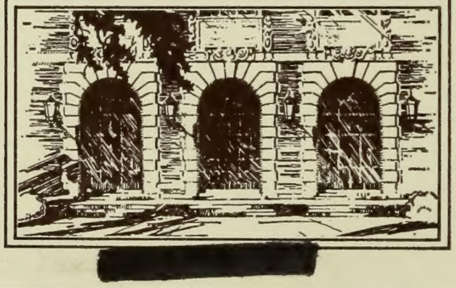

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CARCINOGENESIS ABSTRACTS

National Cancer Institute

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CARCINOGENESIS ABSTRACTS

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PREFACE

Carcinogenesis Abstracts is a publication of the National Cancer Institute. The journal serves as a vehicle through which current documentation of carcinogenesis research highlights are compiled, condensed, and disseminated on a regular basis. It represents an integral part of the Institute's program of fostering and supporting coordinated research into cancer etiology. Issues of *Carcinogenesis Abstracts* normally contain three-hundred abstracts and three-hundred citations (unaccompanied by corresponding abstracts). Abstracts and citations refer to the current scientific literature that describes the most significant carcinogenesis research carried on at the National Cancer Institute, other governmental agencies, and private institutions. *Carcinogenesis Abstracts* is intended to be a highly useful current awareness tool for scientists engaged in carcinogenesis research or related areas. The great number and diversity of publications relevant to carcinogenesis make imperative the availability of this service to investigators whose work requires that they keep abreast with current developments in the field.

Carcinogenesis Abstracts is normally published monthly. Volume XIV covers the scientific literature published from Jan 1976 through Dec 1976. To increase the usefulness of *Carcinogenesis Abstracts*, Volume XIV, a Wiswesser Line Notation index and a Chemical Abstracts Service Registry Number index have been provided. These indexes reference compounds described in abstracted articles. A cumulative subject, author, CAS Registry Number, and Wiswesser Line Notation index for Volume XIV will be published shortly after the final regular issue.

Carcinogenesis Abstracts is available free of charge to libraries and to individuals who have a professional interest in carcinogenesis. Requests for *Carcinogenesis Abstracts* from qualified individuals should include statements of their relationship to carcinogenesis research. All correspondence should be addressed as follows.

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The Secretary of Health, Education and Welfare has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through November 30, 1977.

NOTE

Journal names are abbreviated according to the list of abbreviations used by *Index Medicus*. For journals not covered by *Index Medicus*, the abbreviations found in *Chemical Abstracts Service Source Index*, 1907-1974 Cumulative, are used. New journals are verified in *New Serial Titles* and abbreviated according to *International Standard ISO 833*. An asterisk indicates the author to address (other than the primary) in requesting reprints.

LANGUAGE ABBREVIATIONS

Afr.	Afrikaans	Ind.	Indonesian
Ara.	Arabic	Ita.	Italian
Bul.	Bulgarian	Jpn.	Japanese
Chi.	Chinese	Kor.	Korean
Cro.	Croation	Lav.	Latvian
Cze.	Czech	Lit.	Lithuanian
Dan.	Danish	Nor.	Norwegian
Dut.	Dutch	Pol.	Polish
Eng.	English	Por.	Portuguese
Est.	Estonian	Rum.	Rumanian
Fin.	Finnish	Rus.	Russian
Fle.	Flemish	Ser.	Serbo-Croatian
Fre.	French	Slo.	Slovak
Geo.	Georgian	Spa.	Spanish
Ger.	German	Swe.	Swedish
Gre.	Greek	Tha.	Thai
Heb.	Hebrew	Tur.	Turkish
Hun.	Hungarian	Ukr.	Ukrainian
Ice.	Icelandic	Vie.	Vietnamese

ABBREVIATIONS USED IN ABSTRACTS

A	angstrom(s)	M	molar
ACTH	adrenocorticotropic hormone	mM	millimolar
ADP	adenosine diphosphate	µM	micromolar
AMP	adenosine monophosphate	mOsm	milliosmolar
ATP	adenosine triphosphate	mEq	milliequivalents
BCG	Bacillus Calmette Guerin	min	minute(s)
bid	twice daily	mo	month(s)
C	degrees centigrade	MTD	maximum tolerated dose
cal	calorie(s)	N	normal concentration
kcal	kilocalorie(s)	NAD	nicotinamide adenine dinucleotide
cc	cubic centimeter(s)	NADH	reduced nicotinamide adenine dinucleotide
Ci	curie(s)	NADP	nicotinamide adenine dinucleotidephosphate
mCi	millicurie(s)	NADPH	reduced nicotinamide adenine dinucleotidephosphate
µCi	microcurie(s)		
cm	centimeter(s)	ng	nanogram(s) (10^{-9})
CNS	central nervous system	od	once daily
cpm	counts per minute	Pa	ambient pressure
dl	deciliter(s)	PAS	periodic acid-Schiff
ml	milliliter(s)	pg	picogram(s) (10^{-12})
µl	microliter(s)	pgEq	picogram equivalent
DNA	deoxyribonucleic acid	po	orally
ED$_{50}$	median effective dose	ppb	parts per billion
EDTA	ethylenediamine tetraacetic acid	ppm	parts per million
ESR	erythrocyte sedimentation rate	qid	four times daily
g	gram(s)	qod	every other day
kg	kilogram(s)	QO$_2$	oxygen quotient
mg	milligram(s)	R	roentgen(s)
µg	microgram(s)	RBC	red blood cells (erythrocytes)
Hb	hemoglobin	RNA	ribonucleic acid
hr	hour(s)	sc	subcutaneous
ia	intra-arterial	sec	second(s)
ic	intracerebral	SGOT	serum glutamic-oxalacetic transaminase
icav	intracavitary	SGPT	serum glutamic-pyruvic transaminase
id	intradermal	SRBS	sheep red blood cells
ILS	increased life span	TCD	tissue culture dose
im	intramuscular	TCD$_{50}$	median tissue culture dose
ip	intraperitoneal	tid	three times daily
ipl	intrapleural	U	unit(s)
it	intratumorous	mU	milliunit(s)
IU	International Unit	UV	ultraviolet
iv	intravenous	vol	volume
K_m	Michaelis constant	WBC	white blood cells (leukocytes)
LD	lethal dose	wk	week(s)
LD$_{50}$	median lethal dose	wt	weight
m	meter(s)	x	times
mm	millimeter(s)	yr	year(s)

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0001 "EXCISION" OF BASES FROM DNA METHYLATED BY CARCINOGENS IN VIVO AND ITS POSSIBLE SIGNIFICANCE IN MUTAGENESIS AND CARCINOGENESIS. (Eng.) Lawley, P. D. In: Molecular Mechanisms for Repair of DNA. Edited by P. C. Hanawalt; R. B. Setlow. (New York: Plenum Press): 25-28; 1974.

Evidence concerning the action of a group of carcinogens, designated SN1 agents, that are thought to methylate through a highly reactive methyldiazonium ion, was summarized. Template DNA can be inactivated by hydrolytic depurination of 3- and 7-methylpurines. Mutations may be due to anomalous base-pairing of O^6-methyl-guanine with thymine. The mutagenic efficiency of methylating agents may depend on their mechanism of reaction; if so, the SN1 agents are more potent mutagens. Evidence suggests that ''excision'' of bases could occur more rapidly in vivo than expected. Rapid depurination of methylated bases is probably mediated by an enzyme, endonuclease II. Tumor induction of methylating carcinogens may depend both on specific chemical damage and the occurrence of cell division before the damage is repaired. The excision of bases probably depends on various factors: species, organ, and DNA replication cycle. The persistence of promutagenic bases, especially O^6-methylguanine, until replication and anomalous base-pairing occur, may be necessary for mutagenesis and carcinogenesis. (19 references)

0002 LIVER TUMOURS AND THE PILL (Letter to Editor). (Eng.) O'Sullivan, J. P. (St. George's Hosp. Medical Sch., London SW1, England). *GBr Med J* 4(5999): 756; 1976.

The author points out that tumor-associated focal proliferations of hepatocytes associated with blood-filled cysts are found in hepatic tumors in patients other than those taking oral contraceptives; these include a 6-yr-old girl and a pregnant woman. (4 references)

0003 THE NATURE OF THE ALKYLATION LESION IN MAMMALIAN CELLS. (Eng.) Strauss, B.; Scudiero, D.; Henderson, E. In: *Molecular Mechanisms for Repair of DNA. Basic Life Sciences*, vol. 5A. Edited by Hanawalt, P. C.; Setlow, R. B. New York, Plenum Press, 1975, pp. 13-24.

Methylating agents may produce as many as nine alkylated purine and pyrimidine adducts in DNA, as well as forming phosphotriesters and inducing apurinic sites and strand breaks. Although some of these products are formed in proportionately small amounts, there are sufficient sites affected in the DNA of a mammalian cell to make even the most minor product of potential biological significance. It is not possible to specify the exact reaction sites resulting in biological damage, but it is possible to quantitate the excision-repair of such damage both in the bulk of the DNA and at DNA growing points. Excision-repair was measured in the bulk of the DNA by determining the specific activity of the NaCl eluate of a benzoylated naphthoylated DEAE-cellulose column of extracts of cells after treatment and incubation in the presence of hydroxyurea and labeled thymidine. The average number of nucleotides inserted per methyl methanesulfonate-induced methyl group was 0.1, per apurinic site, 9. Repair in growing-point regions after methyl methanesulfonate treatment occurred to approximately the same extent as in the bulk of the DNA. (30 references)

0004 ORAL CONTRACEPTIVES AND BREAST NEOPLASIA. (Eng.) Anonymous. *Br Med J* 1(6009): 545-546; 1976.

A brief review of epidemiological studies on the relation between oral contraceptives and breast neoplasia is presented. Retrospective and prospective studies have both consistently shown that the use of oral contraceptives is negatively associated with the appearance of benign lumps in the breast, and that this effect is most pronounced in long-term users. One study did reveal, however, a statistically significant excess of women who had used oral contraceptives for 2-4 yr among 452 cancer patients (but not of women using the preparations for shorter or longer periods), and an increase in the risk of developing breast cancer among women who had used contraceptives for 6 yr or more and had also previously had a biopsy for benign breast disease. (12 references)

0005 DES--TRANSPLACENTAL TERATOGEN--AND POSSIBLY ALSO CARCINOGEN. (Eng.) Ulfelder, H. (Vincent Memorial Hosp., Boston, MA 02114). *Teratology* 13(1): 101-103; 1976.

Vaginal and cervical abnormalities seen in women who were exposed during the first 18 wk in utero to stilbestrol or to one of its chemical congeners have three forms: vaginal adenosis, cervical erosions, and ridges. Association between all or several of these findings is the rule. Cancers found in these women were usually of the clear-cell type (originating on the cervix or vagina) and exposure or probable exposure to diethylstilbestrol was documented in over 80% of vaginal and 70% of cervical occurrences. Almost every cancer studied adequately contained coexisting benign adenosis; this supports a hypothesis that cancer develops in the presence of adenosis. Patches of vaginal adenosis failed to stain brown with aqueous iodine solution (Schiller's test); this provides a good diagnostic tool. Colposcopy is also useful. Screening of asymptomatic women had disclosed some early lesions; in this group treatment had the best results. Treatment consists of mechanical excision or destruction of the abnormal areas; gradual replacement of adenosis with squamous epithelium may occur with local corpus luteum hormone therapy (perhaps even without it). Treatment of cancer when present follows standard oncological procedures. Failure to cure this cancer will probably be the result in about 50% of the cases because of early facile spread along lymphatic channels. (3 references)

0006 DISCUSSION PAPER: THE DETECTION OF MUTAGENIC METABOLITES OF CARCINOGENS IN URINE WITH THE *SALMONELLA*/MICROSOME TEST. (Eng.)

McCann, J. (Dept. Biochemistry, Univ. California, Berkeley, CA 94720); Ames, B. N. *Ann NY Acad Sci* 269: 21-25; 1975.

A simple, rapid test that employs histidine mutants of *Salmonella* bacteria and a mammalian microsomal activation system is extremely efficient in the detection of mutagenic carcinogens. Of 139 carcinogens tested, 117 (85%) were detected as mutagens. In contrast, of 59 known noncarcinogens tested (most, close relatives of carcinogens), only five were detected as mutagens. The test was also adapted for detection of mutagenic metabolites of various injected carcinogens in the urine of rats. This has great potential for the screening of human urine. However, the urine test must be validated for efficiency in detecting a wide range of carcinogens, as has the standard test. A generalized extraction procedure is also needed. It is recommended that the standard in vitro test be used for the immediate screening of industrial chemicals, food additives, drugs, etc. (20 references)

0007 THE COSTS OF CANCER. (Eng.)

Nisbet, I. C. T. (No Affiliation Given). *Technol Rev* 78(3): 8-9; 1975.

Social and economic problems arising when a cancer-causing substance is identified are discussed, with particular emphasis on the case of vinyl chloride. Prior to the discovery of its hazards, an estimated 100 million pounds a year were lost to the environment during manufacture and a further 40-50 million pounds were released through deliberate dispersive uses. Although the most hazardous of these uses--as a propellant in spray cans--was banned in 1974, and although attempts are being made to reduce manufacturing losses, human exposure continues. The most serious problem is that trace quantities of unpolymerized vinyl chloride are found in polyvinyl chloride. Both nonoccupational and occupational exposure can be hazardous. Although federal law requires strict regulation of occupational exposure to carcinogens, the proposed standard for vinyl chloride offers little or no assurance of safety. (No references)

0008 MOLECULAR MECHANISMS OF CHEMICAL CARCINOGENESIS. (Eng.)

Magee, P. N.; Pegg, A. E.; Swann, P. F. *In: Handbuch der Allgemunten Pathologie, vol. 6 (Berlin: Springer Verlag):* 329-419; 1975.

A detailed description of the metabolism of the main known chemical carcinogens is presented, followed by a brief account of some of the suggestions that have been advanced to explain their actions. The toxicity, carcinogenicity, metabolism, and interactions of decomposition products of nitroso compounds with cellular components are discussed. Cycasin, dialkylhydrazines, and aryldialkyltriazenes are discussed, and their structures are presented. Alkylating agents and ethionine are discussed, with emphasis on the possible significance of nucleic acid alkylation. Aromatic amines, azo-dyes, 4-nitroquinoline 1-oxide, polycyclic aromatic hydrocarbons, aflatoxins, pyrrolizidine alkaloids and safrole are also discussed. From the studies on these chemicals, it can be concluded that carcinogens are either chemically reactive compounds or are converted, usually by metabolism, into such reactive compounds within the animal. The necessity for activation and the chemical nature of the active intermediate has been clearly established for many carcinogens including 2-acetylaminofluorene, cycasin, and some nitrosamines. The available data is strongly in favor of the hypothesis that polycyclic hydrocarbons require transformation to a chemically reactive intermediate, and the balance of the evidence favors the view that act vation is also necessary in this case. Thus, the pr posal that all chemical carcinogenesis involves the generation from the carcinogens of electrophilic reactants that combine with components of the cells of target tissues appears to be well supported by the experimental results. (740 references)

0009 LATE NEOPLASTIC CHANGES FOLLOWING MEDICAL IRRADIATION. (Eng.)

Hutchison, G. B. (Harvard Sch. Public Health, 665 Huntington Ave., Boston, MA 02115). *Cancer* 37(2): 1102-1107; 1976.

Observations on the long-term effects of medical irradiation are presented. Additions since 1968 to the literature on radiation carcinogenesis in man support the earlier conclusion of an approximately linear increase in cancer incidence in a broad intermediate dose range for most sites of cancer. Questions are raised regarding the nature of the dose-response relation at very low and at very high dose exposures. Analyses of data on exposure to radiation from internal deposits of radioactive material suggest that the dose-response curve at low and intermediate ranges is concave up, implying a smaller effect per unit exposure at very low doses than at intermediate ranges. Data on exposure to the very high but anatomically limited doses of radiation used in cancer therapy give conflicting results, suggesting in one report a continuation of the linear relation into the high-dose range. Other reports suggest a lesser effect per unit dose at high doses than at intermediate doses. Extensive laboratory studies of exposure of experimental animals indicate that over broad dose ranges, exceptions to simple linear relations are the rule, and that factors of dose rate and fractionation also affect the dose-response relation. (44 references)

0010 RADIATION CARCINOGENESIS: LABORATORY STUDIES. (Eng.)

Shellabarger, C. J. (Brookhaven Natl. Lab., Upton, NY 11973). *Cancer* 37(2): 1090-1096; 1976.

A brief review of animal studies following external radiation is presented. For low linear energy transfer (LET) radiation several different dose-response relationships were obtained over a wide range of doses; lengthening the time over which the radiation is given generally lowers the risk of tumor induction. For high LET radiation the dose-response relationship usually appears to be linear, and lengthening the time over which the radiation is spread does not lower the risk of tumor induction. No single relative biological effectiveness (RBE) value for high LET radiation for tumor induction can be given, but current studies point in the direction of an inverse relationship between RBE value and dose. Animal studies of radiation carcinogenesis provide information of more qualitative rather than quantitative significance about human radiation carcinogenesis. (24 references)

0011 THE PROVIRUS OF ROUS SARCOMA VIRUS: SYNTHESIS, INTEGRATION AND TRANSCRIPTION. (Eng.) Bishop, J. M.; Deng, C. T.; Faras, A. J.; Goodman, H. M.; Guntaka, R. R.; Levinson, W. E.; Cordell-Stewart, B.; Taylor, J. M.; Varmus, H. E. In: *Tumor Virus-Host Cell Interaction. NATO Advanced Study Institutes Series: Series A, Life Sciences*, vol. 5. Edited by Kolber, A. New York, Plenum Press, 1975, pp. 255-265.

The current status of efforts to elucidate the details of provirus synthesis in the case of Rous sarcoma virus is summarized. RNA-directed DNA synthesis by detergent-disrupted virions of Rous sarcoma virus initiates by the covalent attachment of pdA to the 3'-terminal rA of a 4S RNA hydrogen-bound to the 70S RNA template. This 4S "primer" has structural features of transfer RNA and can be aminoacylated with methionine. Synthesis and integration of provirus DNA can be monitored in both permissive (duck) and nonpermissive (mouse) cells acutely infected with Rous sarcoma virus. Synthesis of provirus is a prerequisite for both viral replication and cellular transformation by the virus. However, neither integration of viral genes into the host chromosome nor transcription from these genes is necessarily followed by transformation. (21 references)

0012 VACCINIA VIRUS: THE POSSIBILITIES OF ITS ONCOGENICITY IN HUMANS. (Eng.) Michel, N. (Faculty of Medicine and Pharmacy, Mons State Univ., Belgium); Aguilera, A.; Miller, A.; Miller, A. O. A. *Cancer Lett* 1(4): 225-230; 1976.

Contrary to the earlier generally accepted view that vaccinia virus replicates in the cytoplasm only of suitable target cells, steadily accumulating data show that the viral genome spends a limited period of time in the nucleus. This, together with the many cases where a close association was suspected or established between skin cancer and vaccination, suggests that vaccinia virus may, under certain yet undefined physiological conditions, act as an oncogenic virus in humans. If, as the presented evidence indicates, vaccinia virus is oncogenic, then, because the virus genome is carried over many cell generations, vaccination is not only a useless procedure, but also a highly questionable one. (41 references)

0013 VIRUSES AND BRAIN TUMORS. (Eng.) Smith, K. O.; Newman, J. T.; Story, J. L.; Wissenger, J. P. In: *Clinical Neurosurgery. Proceedings of the Congress of Neurological Surgeons, Honolulu, Hawaii, 1973.* (Baltimore: Williams and Wilkins Co.): 21: 362-382; 1974.

Sera from 50 brain tumor patients gave a significantly higher average radioimmunoassay (RIA) reactivity with RD-114 cells (as antigen) than did matched control sera. RD-114 cells and meningioma cells behaved almost identically as antigens when they reacted with tumor patients' sera, and therefore they probably possess common tumor-specific antigens. The existence of antibody to these antigens in sera of certain brain tumor patients is consonant with the possibility that tumors in these patients have a common, possibly viral, etiology. The precise quantitative characteristics of the RIA technique for measuring tumor-specific antibody may have useful diagnostic applications. (63 references)

0014 PREVENTATIVE VACCINATION AGAINST HERPESVIRUS SAIMIRI-INDUCED NEOPLASIA. (Eng.) Ablashi, D. V. (Natl. Cancer Inst., Frederick Cancer Res. Center, Building 538, Fort Detrick, Frederick, MD 21701); Easton, J. M. *Cancer Res* 36(2): 701-702; 1976.

The use of Herpesvirus saimiri as a model for the development of vaccines against herpesvirus-induced neoplasia in primates is discussed. Attempts at protection against the oncogenicity of H. saimiri have centered on the inactivation of virus by heat and formalin, the production of temperature-sensitive H. saimiri mutants, and attenuation by passage in cell culture. Each of these approaches has provided information of use in the development of vaccines that may possibly be used in man. (15 references)

0015 A CELL-SURFACE ANTIGEN COMMON TO HUMAN TUMOURS: DETECTION, LOCALIZATION AND CHARACTERIZATION. (Eng.) Dickinson, J. P. (Cookridge Hosp., Leeds LS16 6QB, United Kingdom); Smith, J. J.; Dyson, J. E. D. *Biochem Soc Trans* 4(1): 125-127; 1976.

An antigen found in a variety of human tumors is described. The antigen is found mainly in carcinomas, and is found in varying states of development and at different sites. Healthy normal subjects do not react to this antigen, while many individuals bearing, or having been cured of, malignancies have reacted to it. The macrophage electrophoretic-mobility test is the technique used for the assay of the antigen, and it depends on specific antigen-stimulated release by lymphocytes of a lymphokine-like substance called macrophage slowing factor. The tumor antigen is almost exclusively localized in the plasma membrane of cultured tumor cells. Antigenic activity is associ- 17,000 daltons. With respect to size, lack of carbohydrate, and tryptophan requirements, the antigen is similar to myelin basic protein, although the differences in specific activities and amino acid contents indicate that they are clearly different materials. (12 references)

0016 IMMUNOLOGIC FACTORS IN EXPERIMENTAL METASTASES FORMATION. (Eng.) Fidler, I. J. (Frederick Cancer Res. Center, Frederick, MD). *Int J Radiat Oncol Biol Phys* 1(1/2): 93-96; 1975.

Immunologic factors involved in metastasis formation are reviewed. The outcome of cancer metastasis is dependent on the interaction of tumor cells with their host, i.e., tumor emboli released into the circulation do not always result in metastasis. There are many factors that influence the host-tumor cell interaction. Among them could be the unique characteristics of malignant tumor cells that allow for their survival: host immune defense mechanisms; immune stimulation-inhibition to tumor growth or spread; and the biological behavior of tumor cells themselves. Future studies concerning manipulation of host defense mechanisms or tumor properties or both, could determine the ideal therapeutic approach toward prevention of metastatic tumor spread. (16 references)

0017 CRITICAL COMMENTS. (Eng.) Zeidman, I. (Univ. Pennsylvania Sch. Medicine, Philadelphia, PA). *Int J Radiat Oncol Biol Phys* 1(1/2): 107-108; 1975.

A triad of reports on cancer metastasis is reviewed, and several findings of other workers are also discussed. Many studies have led to the conclusion that most tumor cell emboli in the blood stream are innocuous. Factors influencing whether or not metastasis will be successful include genetic features, cortisone and pituitary secretions, lymphocyte clumping of emboli, trauma or local damage, and blocking antibodies. The main explanation for the massive kill of tumor cell emboli is probably immunological, involving primarily macrophages. The use of anticoagulants for the prevention of metastasis remains a controversial practice, since some studies have failed to demonstrate any importance of the blood clot in tumor embolus retention as has been theorized. However, one study revealed that platelet reduction is associated with a decrease in metastasis formation. (3 references)

0018 THE TROPHOBLAST THEORY OF CANCER (*JOHN BEARD*, 1857-1924) REVISITED. Gurchot, C. (150 Palo Alto Ave., San Francisco, CA 94114). *Oncology* 31(5-6); 310-333; 1975.

Beard's theory can be restated in a modified form in modern terms in the following way. Cancer represents primarily trophoblastic tissue derived either from an aberrant germ cell or from a somatic cell whose normally repressed 'asexual generation' genes are abnormally reactivated ('derepressed'). The variety of tumors, other than teratomas, may be due to a parallel chance derepression of some genes of somatic ('sexual generation') characters. This would be a defensive reaction against intramural parasitization by trophoblast and would result in the differentiation and hyperplasia of normally present, more primitive somatic cells. (96 references)

0019 THE ROLE OF THE CELL PERIPHERY IN METASTASIS. (Eng.) Weiss, L. (Dept. Dermatology, State Univ. New York Buffalo, Buffalo, NY). *Int J Radiat Oncol Biol Phys* 1(1/2): 97-99; 1975.

The physiochemical nature of the peripheral regions of both normal and cancer cells is thought to play an important role in the process of metastasis. Whether or not malignant cells separate from primary neoplasms depends on whether the peak forces promoting separation (generated by cell and tissue movements, muscular contractions, surgical handling, etc.) exceed the cohesive-adhesive forces holding the cancer cells together in the solid tumor. In order to survive, circulating malignant cells must attach to the vascular endothelium and ''escape'' from the blood stream. Two major factors act to impede direct contact between the cancer and endothelial cells: the considerable mutual electrostatic repulsion generated by their net negative surface charges; and the boundary ''layer'' created at the endothelial surface by the moving plasma. The role of fibrin as an agent for the attachment of the malignant cell to the endothelium is discussed. One study has shown that cell electrophoretic mobility may not consistently be related to normalcy or malignancy, or to metastatic behavior in comparable malignant cells as was previously thought. On the basis of chemical analyses it has been suggested that the acquisition of malignancy is associated with the presence of increased amounts of sialic acid at the cell surface, and that this material protects malignant cells by ''masking'' various antigenic determinants. Despite these studies, the role of the cell periphery in the dissemination of cancer is largely undetermined. (13 references)

0020 CIRCULATING CANCER CELLS AND METASTASES. (Eng.) Fisher, E. R. (Dept. Pathology, Univ. Pittsburgh, Pittsburgh, PA); Fisher, B. *Int J Radiat Oncol Biol Phys* 1(1/2): 87-91; 1975.

Factors associated with the development of hepatic metastases are discussed. Recent studies have clearly demonstrated a continuum between the lymphatic and blood vascular compartments in regard to the circulation of tumor cells. Studies of hepatic metastases artificially induced by intraportal injection of known numbers of tumor cells have indicated diverse modalities involved in augmentation of metastatic growth. These include mechanical hepatic manipulation, partial hepatectomy, interruption or rerouting of the hepatic circulation, cirrhosis, administration of hepatotoxic agents or those stimulating or blocking the reticuloendothelial system, and irradiation. Other experiments have provided support for the recognized clinical observation that tumor cells may reside at various sites in a dormant state for inordinate periods of time, and that such cells are capable of growth after some appropriate stimulus. Anticoagulants and hypophysectomy have been found to inhibit hepatic metastases markedly. The results of these studies indicate that the fate of circulating tumor cells may be influenced by a variety of host factors. (15 references)

0021 PATHOGENESIS OF METASTASIS FORMATION. (Eng.) Sherwin, R. P. (Univ. Southern California Sch. Medicine, 2025 Zonal Ave., Los Angeles, CA). *Int J Radiat Oncol Biol Phys* 1(1/2): 101-105; 1975.

Progress made in the elucidation of the pathogenesis of metastasis formation is reviewed. Contributing factors to cancer dissemination are discussed; these include the internal pressure of the growing tumor mass forcing the peripheral cancer cells into neighboring tissue, tissue breakdown caused by inflammation during early cancer invasion, and the release of hydrolases. The invasive ability of some WBC is compared with that of cancer cells. Many avenues are open to the cancer cell for entering blood vessels and lymphatics. These cells can take advantage of temporary damage to capillary and venular walls, intercellular junctions that open during division of the conjoined cells, endothelial fenestrations, open tumor sinusoids, and the presence of histamine in the bloodstream. The cancer cells may even follow lymphocytes and macrophages through cells or through intercellular junctions. Cancer cells of a primary tumor enter the blood stream at one time or another and are influenced by many factors, which may or may not result in metastasis. Anticoagulant drugs might release showers of cells from tumor thrombi by decreasing adhesiveness of cancer cells, perhaps at the same time preventing their lodging in other vessels. Other agents such as heparinoid, proteolytic enzymes, and surfactant may also increase tumor cell release by decreasing cell surface stickiness, increasing surface electrostatic charges to effect mutual repulsion of cells, or altering the host and its defense mechanisms in a way that favors tumor cell release and vessel lodgement. Cancer necrosis, vessel rupture, and hemorrhage all contribute to cancer seeding of the blood. Once this seeding has occurred, lodgement may or may not occur; the role of blood coagulating factors in this process is discussed. (47 references)

022 CHEMICAL PRESERVATIVES FOR PREVENTION OF MYCOTOXIN PRODUCTION. (Eng.) Anonymous. No affiliation given). *Nutr Rev* 34(1): 31; 1976. 6 references)

0023 BENZENE AND LEUKEMIA. (Eng.) Vigliani, E. C. (Clinica del Lavoro L. Devoto, Univ. Milan, Italy); Forni, A. *Environ Res* 11(1): 122-127; 1976. (19 references)

0024 CARCINOMA OF THE BRONCHUS-1: INCIDENCE AND AETIOLOGY. (Eng.) Deeley, T. J. (South Wales and Gwent Radiotherapy Service, U.K.). *Nurs Times* 72(3): 98-99; 1976. (1 reference)

0025 MODEL SYSTEMS FOR CERVICAL CANCER. (Eng.) Munoz, N. (International Agency for Res. on Cancer, 150, Cours Albert Thomas, 69008 Lyon, France). *Cancer Res* 36(2): 792-793; 1976. (18 references)

0026 THE IMMUNOBLAST. (Eng.) Florentin, I. (Institut de Cancerologie et d'Immunogenetique de l'Hopital Paul-Brousse, 14-16, avenue Paul-Vaillant-Couturier, 94800 Villejuif, France). *Biomedicine* 22(6): 457-460; 1975. (71 references)

0027 TRANSFORMATION OF MAMMALIAN CELLS TO MALIGNANCY BY HUMAN HERPES VIRUSES. (Eng.) Rapp, F. In: *Advances in the Biosciences 12. Schering Symposium on Immunopathology, Cavtat, Yugoslavia, May 28 to June 1, 1973.* International Committee of Immunopathology with the co-sponsorship of World Health Organization. (Pergamon Press, Vieweg, W. Germany): pp. 605-615; 1974. (43 references)

0028 LARYNGEAL PAPILLOMATOSIS: IMMUNOLOGIC AND VIRAL BASIS FOR THERAPY. (Eng.) Bone, R. C. (Univ. California Sch. Medicine, San Diego, CA); Feren, A. P.; Nahum, A. M.; Winkelhake, B. G. *Laryngoscope* 86(3): 341-348; 1976. (40 references)

0029 SERUM FACTORS MODIFYING LYMPHOCYTE CYTOTOXICITY FOR TUMOR CELLS. (Eng.) Baldwin, R. W.; Bowen, J. G.; Embleton, M. J.; Price, M. R.; Robins, R. A. In: *Advances in the Biosciences 12, Schering Symposium on Immunopathology, Cavtat, Yugoslavia, May 28 to June 1, 1973.* International Committee of Immunopathology with the co-sponsorship of World Health Organization. (Pergamon Press, Vieweg, W. Germany): pp. 539-552; 1974. (30 references)

0030 METASTASES AND DISSEMINATED CANCER: I. FORMATION INTRODUCTION. (Eng.) Rubin, P. (Strong Memorial Hosp., 601 Elmwood Ave., Rochester, NY). *Int J Radiat Oncol Biol Phys* 1(1/2): 85; 1975. (2 references)

0031 IN VITRO SENESCENCE OF MAMMALIAN CELLS. (Eng.) Choe, B.-K. (Wayne State Univ. Medical Sch., 540 E. Canfield, Detroit, MI 48201); Rose, N. R. *Gerontology* 22(1/2): 89-108; 1976. (10 references)

0032 PROTEIN-LIPOSOME INTERACTIONS AND THEIR RELEVANCE TO THE STRUCTURE AND FUNCTION OF CELL MEMBRANES. (Eng.) Kimelberg, H. K. (Albany Medical Coll. Union Univ., Albany, NY 12208). *Mol Cell Biochem* 10(3): 171-190; 1976. (163 references)

0033 SOME INTERACTIONS OF LIGHT, RIBOFLAVIN, AND AFLATOXIN B$_1$ IN VIVO AND IN VITRO. (Eng.) Joseph-Bravo, P. I. (Dept. Nutrition and Food Science, Massachusetts Inst. Technology, Cambridge, MA); Findley, M.; Newberne, P. M. *J Toxicol Environ Health* 1(3): 353-376; 1976.

The interaction of riboflavin, aflatoxin, and light was studied with Sprague-Dawley rats. In a study of carcinogenesis, rats received 25 μg aflatoxin B$_1$ (in 0.2 ml dimethylsulfoxide (DSMO) intragastrically) 5 days/wk for 3 wk; 30 min after each dosing, half of them were irradiated for 2 hr. Glucose-6-phosphatase levels 5 days after treatment were about twice as high in livers from aflatoxin-treated (with or without light treatment) as in livers from DSMO-treated rats. At 53 wk, all 11 of the aflatoxin-treated rats remaining had liver parenchymal tumors; only 5 of 12 of the aflatoxin plus light-treated rats had such tumors. In the second experiment, rats were dosed with riboflavin (1 or 10 mg/kg) and divided into four groups: no further treatment; aflatoxin (LD$_{50}$); irradiation (1-2 hr); or aflatoxin plus irradiation. Aflatoxin caused blood riboflavin levels to decrease. This effect was enhanced by irradiation, suggesting that photosensitized riboflavin and aflatoxin form a complex. Studies in vitro that showed that riboflavin quenched aflatoxin photodegradation, perhaps by complexing with aflatoxin. Thus, low carcinogenic doses of aflatoxin may complex with endogenous, photosensitized riboflavin, inhibiting its degradation into carcinogenic metabolites.

0034 PURIFICATION OF THE *AGROBACTERIUM RADIOBACTER* 84 AGROCIN. (Eng.) Heip, J. (Laboratoria voor Genetika en Histologie, Rijksuniversiteit Gent); Chatterjee, G. C.; Vandekerckhove, J.; Van Montagu, M.; Schell, J. *Arch Int Physiol Biochim* 83(5): 974-976; 1975.

The purification of agrocin 84, produced by *Agrobacterium radiobacter* strain 84, is described. After incubating the producing strain for 48 hr at 27 C on a minimum medium, the petri-dishes were frozen at -20 C. Thawing, CHCl$_3$ treatment, and centrifugation of the collapsed agar yielded an active supernatant from which most of the proteins and nucleic acids were precipitated by 70% ethanol. The agrocin was obtained in a pure form using paper electrophoresis at pH 6.5 and pH 3.5. The substance was found to be resistant to pronase, trypsin, RNase, and DNase; it is also relatively heat stable, acidic, and of low molecular weight.

0035 AFLATOXIN B$_1$: SPECIFIC ANTIBODIES AND THEIR USE IN RADIOIMMUNOASSAY. (Eng.) Langone, J. J. (Dept. Biochemistry, Brandeis Univ., Waltham, MA 02154); Van Vunakis, H. *J Natl Cancer Inst* 56(3): 591-595; 1976.

New Zealand White rabbits were immunized with covalent conjugates prepared from polylysine and the O-carboxymethyloxime derivatives of either aflatoxin B$_1$ (AFB$_1$) or an analogue, 5,7-dimethoxycyclopentenon(2,3-c)coumarin. These animals produced antibodies that bound ^{3}H-aflatoxin B$_1$. The specificities of the antisera with respect to aflatoxins B$_2$, B$_2$a, G$_1$, G$_2$, Q$_1$, P$_1$ and some other structurally related compounds were determined. Radioimmunoassays that can detect levels as low as 0.27 pM (0.06 ng) of AFB$_1$ were used to analyze serum, urine, and crude extracts of corn and peanut butter supplemented with aflatoxin. In the foodstuffs, as little as 1 μg AFB$_1$/kg was measured. The immunoassay was at least as sensitive and specific as other available analytic methods, but did not require the purification of samples by chromatography before analysis. The technique may be particularly useful in epidermiologic studies designed to study the possible relationship between chronic aflatoxin ingestion and cancer.

0036 PRODUCTION OF FRAMESHIFT MUTATIONS IN SALMONELLA BY A LIGHT SENSITIVE AZIDE ANALOG OF ETHIDIUM. (Eng.) Yielding, L. W. (Lab. Molecular Biology, Univ. Alabama, University Station Box 319, Birmingham, AL 35294); White, W. E., Jr.; Yielding, K. L. *Mutat Res* 34(3): 351-358; 1976.

Frameshift mutations were produced in specific repair-negative *Salmonella typhimurium* tester strains (1535, 1536, 1537, 1538, 1977, and 1978) by photoaffinity labeling technique using ethidium azide. Reversions requiring a +1 addition or a -2 deletion were especially sensitive. Mutagenesis was reduced by the simultaneous addition of nonmutagenic ethidium bromide, and was prevented by photolysis of the azide prior to culture addition. Identical tester strains active in DNA excision repair were not mutagenized by the azide. This was consistent with the interpretation that photolysis of the bound ethidium analog converts the drug from its noncovalent mode of binding (presumably intercalation) to a covalent complex with consequent production of frame shift mutations. Such photoaffinity labeling by drugs which bind to DNA not only confirms the importance of covalent drug attachment for frameshift mutagenesis, but also provides techniques for studying the molecular details of a variety of genetic mechanisms.

0037 DETECTION OF CARCINOGENS AS MUTAGENS IN THE *SALMONELLA*/MICROSOME TEST: ASSAY OF 300 CHEMICALS: DISCUSSION. (Eng.) McCann, J. (Dept. Biochemistry, Univ. California, Berkeley, CA 94720); Ames, B. N. *Proc Nat Acad Sci USA* 73(3): 950-954; 1976.

About 300 carcinogens and noncarcinogens of a wide variety of chemical types were previously tested for mutagenicity in the simple *Salmonella*/microsome test. Bacteria were used as sensitive indicators of DNA damage, and mammalian liver extracts were used for metabolic conversion of carcinogens to their active mutagenic forms. There was a high correlation between carcinogenicity and mutagenicity: 90%(157/175) of the carcinogens were mutagenic in the test, including almost all of the known human carcinogens tested. Despite the severe limitations inherent in defining noncarcinogenicity, few ''noncarcinogens'' showed any degree of mutagenicity. In the present paper, carcinogens negative in the test and apparent false positives are discussed. Evidence that chemical carcinogens and radiation, likely to initiate most human cancer and genetic defects, do so by damage to DNA, is also discussed. The *Salmonella* test can play a central role in a program of prevention: to identify mutagenic chemicals in the environment (all indications are that there are many) and to aid in the development of nonmutagenic products to prevent future human exposure.

0038 EXPERIMENTALLY INDUCED *MYCOBACTERIUM AVIUM* SEROTYPE 8 INFECTION IN SWINE. (Eng.) Thoen, C. O. (Animal and Plant Health Inspection Station, U.S. Dept. Agriculture, Ames, IA 50010); Johnson, D. W.; Himes, E. M.; Monke, S. B.; Muscoplat, C. C. *Am J Vet Res* 37(2): 177-181; 1976.

Five of six swine experimentally inoculated with *Mycobacterium avium* serotype 8 had microgranulomas in the cervical or mesenteric lymph nodes at necropsy 92 days later. In vivo tuberculin skin reactivity and in vitro lymphocyte immunostimulation responses were evaluated at 10 and 12 wk after the pigs were inoculated. Positive responses were obtained on both tests in inoculated pigs; test results in noninoculated pigs and pigs given killed bacterial cells were negative. *Mycobacterium avium* serotype 8 was isolated at necropsy from the cervical or mesenteric lymph nodes of each of the pigs inoculated with viable microorganisms and from the 2 pigs kept in the pen with inoculated swine. Mycobacteria were not isolated from tissues of the noninoculated swine or those given killed cells.

0039 THE DISTURBANCE OF OXIDATIVE PHOSPHORYLATION BY N-ACETOXY-N-ACETYL-2-AMINOFLUORENE, A MODEL ULTIMATE CARCINOGEN. (Eng.) Hadler, H. I. (Dept. Chemistry and Biochemistry, Southern Illinois Univ., Carbondale, IL 62901); Demetriou, J. M. *J Antibiot* 28(10): 809-818; 1976.

N-acetoxy-N-acetyl-2-aminofluorene, a model of the ultimate electrophilic carcinogenic agent derived metabolically from N-acetyl-2-aminofluorene, induced in vitro a delayed ATP energized increase in mitochondrial volume. The ATP energized decrease in absorbancy, at 520 nm, was inhibited by rutamycin, 2,4-dinitrophenol and a high level of antimycin known to induce ATPase activity. The ATP energized effect was not altered either by rotenone or by a low level of antimycin known to inhibit respiration without inducing ATPase activity. Malate or potassium ion did not affect the phenomenon, but sulfate ion, which has been implicated in liver carcinogenesis, shortened the induction period. Showdomycin stimulated the phenomenon. N-acetoxy-N-acetyl-2-aminofluorene was enzymically converted by the mitochondria to N-hydroxy-N-acetyl-2-aminofluorene. These findings extend the experimental confluence of oxidative phosphorylation with carcinogenesis.

0040 ENZYMIC DEACETYLATION OF CARCINOGENIC ARYLACETAMIDES BY TISSUE MICROSOMES OF THE DOG AND OTHER SPECIES. (Eng.) Lower, G. M., Jr. (Univ. Wisconsin Medical Sch., Madison, WI); Bryan, G. T. *J Toxicol Environ Health* 1(3): 421-432; 1976.

The ability of arylacetamide deacetylase enzyme systems of dog liver to deacetylate 4-acetylaminobiphenyl, 2-acetylaminofluorene, and 2-acetylaminonaphthalene, was examined. The arylacetamides were incubated with unfortified dog liver microsomes, and enzyme activity was expressed as nmole arylamine/mg protein/hr. The dog liver enzyme system was similar to the rodent liver enzyme system; the enzyme activity was greatest in liver tissue, was localized in the microsomal subcellular fraction, required no cofactors, and was inhibited by heat, sodium fluoride, and thiol reagents. In five replicate assays, the relative rates of deacetylation were about 10, 6, and 1 with 4-acetylaminobiphenyl (84.8 ± 12.4), 2-acetylaminofluorene (52.5 ± 5.1), and 2-acetylaminonaphthalene (8.8 ± 3.3), respectively. As a canine urinary bladder carcinogen, 4-acetylaminobiphenyl is considered more potent than 2-acetylaminofluorene, while 2-acetylaminonaphthalene is devoid of detectable carcinogenic activity, despite the fact that 2-aminonaphthalene is a well-established canine urinary bladder carcinogen. The present studies demonstrate a direct relationship between dog liver deacetylase enzyme specificity and urinary bladder susceptibility to these carcinogenic arylacetamides. The susceptibility of different species to arylamines and arylacetamides is partly determined by N-acetyltransferase and deacetylase activities.

0041 EFFECTS OF N-ACETOXY-2-ACETYLAMINOFLUORENE AND N-METHYL-N'-NITRO-N-NITROSOGUANIDINE ON NUCLEAR DNA SYNTHESIS IN RAT LIVER. (Eng.) Guzzo, G. J. (Dept. Pharmacology, Emory Univ., Atlanta, GA 30322); Glazer, R. I. *Cancer Res* 36(3): 1041-1048; 1976.

A system for the study of DNA synthesis in isolated nuclei is described for sham and regenerating rat liver. The system was characterized with respect to nuclear purity, conditions for optimum incorporation of [5-methyl-^{3}H]thymidine triphosphate, time course of incorporation, product analysis by neutral and alkaline sucrose gradients, and the effect of exogenously added DNA. No difference in the basal level of activity was detected between nuclei prepared from normal or regenerating liver when isolated 24 hr after operation. However, exogenous activated DNA preferentially stimulated [5-methyl-^{3}H]thymidine triphosphate incorporation in nuclei from regenerating liver. Activated DNA caused to react with the carcinogen N-acetoxy-2-acetylaminofluorene was a less effective primer-template in this system and decreased in a dose-dependent fashion the incorporation of [5-methyl-^{3}H]thymidine triphosphate to below basal levels in nuclei from both normal and regenerating liver. The carcinogen N-methyl-N'-nitro-N-nitrosoguanidine had no inhibitory effect when assayed in this fashion.

0042 A NEW GROUP OF POTENT INDUCERS OF DIFFERENTIATION IN MURINE ERYTHROLEUKEMIA CELLS. (Eng.) Reuben, R. C. (Cancer Res. Center, Columbia Univ., New York, NY 10032); Wife, R. L.; Breslow, R.; Rifkind, R. A.; Marks, P. A. *Proc Nat Acad Sci USA* 73(3): 862-866; 1976.

A group of compounds, polymethylene bisacetamides (acetylated diamines), were identified as potent inducers of erythroid differentiation in murine erythroleukemia cells. A known inducing agent, N-methylacetamide, was dimerized through varying numbers of methylenes in an attempt to increase the local effective concentration at adjacent target sites. The simple dimer was no more effective than N-methylacetamide alone; introduction of 5-8 methylenes between acetamide groups substantially increased the effectiveness of these compounds. The hexamethylene bisacetamide was active between 0.5 mM and 5 mM; the percentage of cells induced and the rate at which they were recruited to differentiation were dependent upon the concentration of inducer within this range. At 5 mM hexamethylene bisacetamide, essentially the entire population (>99%) was induced to a pathway of erythroid differentiation, which was greater differentiation of the cultured cells than that obtained with any inducer yet tested.

0043 POLYADENYLIC ACID CONTENT AND ELECTROPHORETIC BEHAVIOR OF IN VITRO RELEASED RNA'S IN CHEMICAL CARCINOGENESIS. (Eng.) Smuckler, E. A. (Dept. Pathology, Univ. Washington, Seattle, WA 98195); Koplitz, R. M. *Cancer Res* 36(3): 881-888; 1976.

Cytoplasmic RNA from control and thioacetamide-intoxicated male Sprague-Dawley rat livers was compared with regard to components separated by polyacrylamide electrophoresis and for the proportion containing polyadenylic acid segments. A further comparison was made with the RNAs released from rat liver nuclei in vitro. The yield of RNA separated from a 6,000 x g supernatant was 84.7% of the total trichloracetic acid-precipitable pool; no differences were encountered between material isolated from controls vs the in vivo carcinogen-treated rat livers. Exposure in vivo to thioacetamide was associated with more cytoplasmic RNAs with migrations of 9 to 16 S and with both an acute and prolonged increase in the relative quantity of polyadenylic acid-containing polyribonucleotides. Incubation of control nuclei in vitro was associated with a leakage of approximately 1 to 2% of nuclear RNA with a major migration band at 9 S. Addition of adenosine 5'-triphosphate increased the transport 20-fold, and 9 to 16 S species were transported as well as a 4 S group. Following exposure to thioacetamide, an enhanced ''leakiness'' released 9 S RNA. Addition of adenosine 5'-triphosphate doubled the quantity of released RNA, which consisted of 9 and 4 S species. Both leaked and adenosine 5'-triphosphate-transported RNAs contained polyadenylic acid segments in roughly 20% of the macromolecules. The RNA released, both in the presence and absence of ATP, had a motility consistent with messenger-like species, 9 to 16 S. These studies extend the observation of less stringent control of RNA release and transport in carcinogen exposure and suggest the potential usefulness of the in vitro release system for assaying cellular regulatory phenomena.

0044 EFFECT OF PARTIAL HEPATECTOMY ON TUMOR INCIDENCE AND METABOLISM OF MICE FED THIOACETAMIDE. (Eng.) Date, P. A. (Cancer Res. Inst., Parel, Bombay 12, India); Gothoskar, S. V.; Bhide, S. V. *J Natl Cancer Inst* 56(3): 493-497; 1976.

Tumor incidence and sequential changes in carbohydrate metabolism in the livers and tumor tissues of partially hepatectomized mice fed thioacetamide (TAA) after surgery were observed. Six-wk-old male Swiss mice were given 0.03% TAA in the diet 24, 72, and 168 hr after partial hepatectomy. Treated mice from all three groups were killed when they were 4, 9, and 13 mo old. Intact and partially hepatectomized animals on normal diets evidenced no neoplasms. All three experimental groups developed liver tumors earlier than did intact mice treated with the TAA diet. Progressive metabolic studies on the livers or tumor tissues of treated mice showed that the levels of glucose-6-phosphatase, fructose-1,6-diphosphatase, and glycogen decreased significantly in the 4-mo-old treated group when there was no significant alteration in liver histology. These parameters were lowest in the tumor tissues of treated mice.

0045 STIMULATION OF CARCINOGEN-INDUCED MAMMARY TUMOR GROWTH IN RATS BY ADRENALECTOMY. (Eng.) Chen, H. J. (Dept. Physiology, Michigan State Univ., East Lansing, MI 48824); Bradley, C. J.; Meites, J. *Cancer Res.* 36(4): 1414-1417; 1976.

The effect of adrenalectomy on 7,12-dimethylbenz(a)-anthracene-induced mammary tumor growth was studied in female Sprague-Dawley rats. Weekly measurements revealed that both mammary tumor size and number were significantly increased and serum prolactin levels were elevated as compared to controls. Daily injection of 1 mg hydrocortisone acetate into intact 7,12-dimethylbenz(a)anthracene-tumor bearing rats did not significantly alter tumor size, number, or serum prolactin levels but, when injected into adrenalectomized rats, it prevented increased tumor growth and prolactin release. Daily injection of ovine prolactin and hydrocortisone suppressed endogenous prolactin release but significantly increased tumor size and number. Ergocornine, a prolactin inhibitor, blocked adrenalectomy-induced tumor growth and partially blocked prolactin release. These results indicate that adrenalectomy in rats stimulates tumor growth by increasing prolactin release.

0046 SCANNING ELECTRON MICROSCOPY OF IN VITRO CHEMICALLY TRANSFORMED MOUSE EMBRYO CELLS. (Eng.) Malick, L. E. (Univ. Nebraska Medical Center, Omaha, NB 68105); Langenbach, R. *J Cell Biol* 68(3): 654-664; 1976.

A cloned nontumorigenic control cell line of C3H mouse embryo cells (C3H/10T1/2CL8) and two cell lines derived from it by treatment in vitro with 7,12-dimethylbenz(a)anthracene (DMBA) or 3-methylcholanthrene (MCA) were studied by scanning electron microscopy. Confluent control cells were polygonal in shape and extensively flattened with smooth surfaces. Both in vitro transformants were pleomorphic to fusiform in shape, thicker than the control cells, and lacked contact inhibition. Microvilli of variable length and small marginal ruffles were characteristic surface alterations of the MCA-transformed cells, while blebs and numerous cytoplasmic strands extending between cells were typical of the DMBA transformant. DMBA-transformed cells showed a different growth pattern in exponential cultures and in confluent cultures than do the parent cells. Inoculation of the DMBA-transformed cells into C3H mice and re-establishment of cells from one of the subsequent fibrosarcomas in culture revealed an increased number of microvilli on the surface of the cells and an alteration in growth pattern. Other surface characteristics remained the same. A possible relationship between surface topography and outer membrane glycolipids is discussed.

0047 BRIEF COMMUNICATION: RELATIONSHIP OF ADENOSINE-3',5'-CYCLIC MONOPHOSPHATE TO GROWTH OF DIMETHYLBENZ[a]ANTHRACENE-INDUCED MAN MAMMARY TUMORS IN RATS. (Eng.) Matusik, R. J. (Univ. Rochester Sch. Medicine and Dentistry, Rochester, NY 14642); Hilf, R. *J Natl Cancer Inst* 56(3): 659-661; 1976.

Alteration of growth of dimethylbenz[a]anthracene-induced mammary tumors in Sprague-Dawley rats was caused by removal of estrogen (ovariectomy), or insulin (diabetes), or by inhibition of prolactin secretion (treatment with an ergoline derivative). The levels of cyclic AMP (cAMP) and cGMP were measured in growing, static, and regressing carcinomas. The amount of cAMP, expressed as pmoles/mg tumor weight or pmoles/mg protein, was lowest in growing tumors, intermediate in static tumors, and highest in those regressing. No correlation was seen between tumor growth and cGMP levels. Cyclophosphamide-induced tumor stasis did not elevate cAMP levels. The data suggest a role of cAMP in arrest of hormone-induced tumor growth.

0048 LACK OF CORRELATION BETWEEN THE PRESENCE OF ESTROGEN RECEPTOR AND HISTOLOGICAL TYPE OF MAMMARY CANCER INDUCED BY 7,12-DIMETHYLBEN [a]ANTHRACENE. (Eng.) Nomura, Y. (Natl. Kyushu Cancer Center Hosp., Notame 595, Minami-ku, Fukuok 815, Japan); Abe, Y.; Yamagata, J.; Takenaka, K. *Gann* 66(6): 689-691; 1975.

The relation between the histological type and the presence of estrogen receptor or response to oophorectomy was investigated in the mammary cancer induced by 7,12-dimethylbenz[a]anthracene in Sprague-Dawley rats. The estrogen receptor was present in 75.0% (3 of 4) of poorly differentiated cancer and in 62.5% (10 of 16) of well-differentiated cancer. The histological degree of differentiation or grading of the rat mammary cancer did not affect the presence of the estrogen receptor or response to oophorectomy. In contrast, there was clearly a good correlation between the presence of the receptor and response to oophorectomy.

0049 MUTABILITY OF DIFFERENT GENETIC LOCI IN MAMMALIAN CELLS BY METABOLICALLY ACTIVATED CARCINOGENIC POLYCYCLIC HYDROCARBONS. (Eng.) Huberman, E. (Dept. Genetics, Weizmann Inst. Sci., Rehovot, Israel); Sachs, L. *Proc Natl Acad Sci USA* 73(1): 188-192; 1976.

The relation between carcinogenesis and mutagenesis in mammalian cells was studied with 10 polycyclic hydrocarbons with different degrees of carcinogenicity. Mutagenesis was determined in Chinese hamster cells with genetic markers that affect the surface membrane, nucleic-acid synthesis, and protein synthesis. The mutations were characterized by resistance to ouabain, 8-azaguanine, and temperature. Mutagenesis by the carcinogens required metabolic activation and this was provided by the presence of lethally irradiated metabolizing cells. The degree of carcinogenicity was related to the degree of mutagenicity for all three genetic markers. The most potent carcinogen, 7,12-dimethylbenz[a]anthracene, gave the highest mutagenicity and a significant degree of mutagenicity was obtained with 0.01 μg/ml. Treatment of the cells with aminophylline, which increases polycyclic hydrocarbon metabolism, increased mutagenesis by the carcinogens. The authors suggest that such an experimental system with these and other mammalian cells should be useful as a sensitive assay for hazardous environmental chemicals.

)050 INHIBITION OF TWO-STAGE CARCINOGENESIS OF MOUSE SKIN WITH BIS(2-CHLOROETHYL)SUL-
IDE.

(Eng.) Van Duuren, B. L. (New York Univ.
ledical Center, New York, NY 10016); Segal, A.
ancer Res 36(3): 1023-1025; 1976.

he effect of sulfur mustard [SM; bis(2-chloro-
thyl)sulfide] on 7,12-dimethylbenz(a)anthracene
arcinogenesis was tested. ICR/Ha Swiss mice, 30
emales/group, were given a single application of
0 µg 7,12-dimethylbenz(a)anthracene, followed
wo weeks later by three times weekly applications
f phorbol myristate acetate (PMA, 2.5 µg/appli-
ation). In the accompanying inhibition experi-
ents, SM was applied at a dose of 20 µg/appli-
ation during the promotion phase, either on the
ame day as PMA, i.e., three times weekly, or on
lternate days, i.e., twice weekly. The experi-
ents were continued for 385 days. The control
roup, i.e., without SM, resulted in 27 of 30 mice
ith a total of 281 papillomas. Sixteen of these
ice also bore squamous cell carcinomas. In the
wo groups also receiving SM, 2 or 3 times weekly,
of 30 and 1 of 30 mice, respectively, bore papil-
omas. Carcinomas were not observed in these
roups. The inflammatory response of mouse skin to
he combined treatments of SM and PMA was no
reater than with PMA alone.

)51 MICROSOMAL N-OXIDATION OF THE HEPATOCARCINOGEN N-METHYL-4-AMINOAZOBENZENE AND
IE REACTIVITY OF N-HYDROXY-N-METHYL-4-AMINOAZOBEN-
ENE.

(Eng.) Kadlubar, F. F. (Univ. Wisconsin
edical Sch., Madison, WI 53706); Miller, J. A.;
iller, E. C. *Cancer Res* 36(3): 1196-1206; 1976.

ie N-oxidation of the hepatocarcinogen N-methyl-4-
inoazobenzene (MAB) was catalyzed by hepatic
icrosomes in a reduced pyridine nucleotide- and
ygen-dependent reaction. The initial N-oxidation
oduct, N-hydroxy-N-methyl-4-aminoazobenzene (N-
)-MAB), was readily oxidized to a second product
iat yielded N-hydroxy-4-aminoazobenzene upon
ibsequent acid treatment. The secondary N-oxida-
on product may be formed nonenzymatically and is
esumed to be N-HO-MAB N-oxide or its dehydrated
rivative, N-(p-phenylazophenyl)nitrone. Under
ie same conditions, MAB was also oxidatively N-
alkylated to 4-aminoazobenzene. Unlike the latter
actions, the microsomal N-oxidation of MAB was
dependent of cytochrome P-450, as shown by its
ck of sensitivity to inhibition by 2-[(2,4-dichlo-
-6-phenyl)phenoxy]ethylamine and its inability
utilize cumene hydroperoxide in place of reduced
ridine nucleotides and oxygen. The N-oxidation
MAB was also catalyzed by a purified microsomal
avo-protein mixed-function amine oxidase. N-HO-
B, N-hydroxy-N-ethyl-4-aminoazobenzene, and N-
droxy-4-aminoazobenzene catalyzed the aerobic
idation of cysteine and glutathione. These hy-
oxylamines also bound covalently to proteins.
e binding of N-HO-MAB with nucleic acids was
ly 3-6% that observed with serum albumin. Under
hydrous conditions the nitrone generated aero-
cally from N-HO-MAB reacted with carbon-carbon or carbon-nitrogen double bonds, or both, in fatty acids, retinol, purines, and pyrimidines to yield isoxazolidine and/or oxadiazolidine addition products. The nitrone from N-hydroxy-N-ethyl-4-aminoazobenzene was much less reactive under these conditions.

0052 BRIEF COMMUNICATION: HEPATIC CYTOLOGIC AND NEOPLASTIC CHANGES IN MICE GIVEN BENZIDINE DIHYDROCHLORIDE.

(Eng.) Frith, C. H. (Univ. Arkansas for Medical Sciences, Little Rock, AR 72201); Dooley, K. *J Natl Cancer Inst* 56(3): 679-682; 1976.

The administration of benzidine dihydrochloride in water to BALB/c stCrl mice for up to 39 wk resulted in hemosiderosis of the spleen, focal vacuolization of the transitional epithelium of the urinary bladder, and chronic inflammation and cytologic and neoplastic changes in the liver. Basophilic and acidophilic cytologic foci appeared in the liver as two distinct entities and both appeared preneoplastic. Benign and malignant liver tumors were also seen. Both types of cytologic changes and malignant liver tumors were more common in the female than the male mice.

0053 3,4-BENZOPYRENE (A NEW REFINEMENT).

(Eng.) Iball, J. (Univ. Dundee, Dundee, DD1 4HN, Scotland); Scrimgeour, S. N.; Young, D. W. *Acta Crystallogr* B32(1): 328-330; 1976.

New diffraction data were collected for the carcinogen 3,4-benzopyrene from equi-inclination Weissenberg photographs (Cu K alpha radiation). No correction was made for absorption (micro = 5.95 cm^{-1}). The parameters for C atoms were refined anisotropically by block-diagonal least-square calculations. The final R was 0.069 for 1165 observed reflexions. There are two short so-called K regions of phenanthrene on the molecule. The molecule is nearly planar, with overcrowding due to H atoms which is relieved by a slight twisting.

0054 SEPARATION OF TEN BENZO(A)PYRENE PHENOLS BY RECYCLE HIGH PRESSURE LIQUID CHROMATOGRAPHY AND IDENTIFICATION OF FOUR PHENOLS AS METABOLITES.

(Eng.) Croy, R. G. (Natl. Cancer Inst., Bethesda, MD); Selkirk, J. K.; Harvey, R. G.; Engel, J. F.; Gelboin, H. V. *Biochem Pharmacol* 25(2): 227-230; 1976.

Reverse phase high-pressure liquid chromatography (HPLC) was used in the isolation of benzo(a)pyrene (BP) phenol metabolites. In addition 10 synthetic phenols were resolved. The chromatography was a modified recycle system in which a HPLC column was fitted with two Zorbax-sil columns connected to a 6-port valve assembly and arranged for flow through either two columns in series or through an 8 µl UV flow cell between columns. The solvent mixture was hexane:dioxane (9:1) containing 40 µl formic acid/200 ml solvent. With this technique, four distinct peaks of metabolically formed phenols were resolved after passage through five columns. The major peaks were 3-OH-benzo(a)pyrene and 9-OH-benzo(a)-pyrene. In addition, two newly isolated peaks, 1-OH-benzo(a)pyrene and 7-OH-benzo(a)pyrene were identified. HPLC is a sensitive and rapid technique for the isolation of BP metabolites.

0055 BINDING OF K- AND NON-K-REGION ARENE OXIDES AND PHENOLS OF POLYCYCLIC HYDROCARBONS TO POLYGUANYLIC ACID.

(Eng.) Blobstein, S. H. (Coll. Physicians and Surgeons, Columbia Univ., New York, NY 10032); Weinstein, I. B.; Dansette, P.; Yagi, H.; Jerina, D. M. *Cancer Res* 36(4): 1293-1298; 1976.

The reaction of 12 different K- and non-K-region arene oxides and 7-benzo(a)pyrene phenols with polyguanylic acid in aqueous acetone solutions was investigated. The extent of binding of the polycyclic hydrocarbon was monitored by changes in the UV absorption and fluorescence spectra of the reisolated polyguanylic acid. The most reactive compound was the K-region arene oxide of 7,12-dimethylbenz(a)anthracene. A lower but significant level of binding was detected with the K-region arene oxides of benz(a)anthracene, benzo(a)pyrene, and 3-methylcholanthrene. Very low or negligible binding was detected with the K-region arene oxides of pyrene and phenanthrene, as with the non-K-region arene oxides of benzo(a)pyrene, phenanthrene, and naphthalene, and all of the benzo(a)pyrene phenols. Significant differences in the fluorescence spectra of polyguanylic acid modified with three different benzo(a)pyrene arene oxides were observed.

0056 CARCINOGENICITY OF BENZO[a]PYRENE 4,5-, 7,8-, and 9,10-OXIDES ON MOUSE SKIN.

(Eng.) Levin, W. (Dept. Biochemistry and Drug Metabolism, Hoffmann-La Roche Inc., Nutley, NJ 07110); Wood, A. W.; Dansette, P. M.; Jerina, D. M.; Conney, A. H. *Proc Natl Acad Sci USA* 73(1): 243-247; 1976.

Benzo[a]pyrene (BP) and three arene oxides of BP (BP 4,5-, 7-8-, and 9,10-oxides) were tested for carcinogenicity in female C57BL/6J mice. The compounds (0.1 or 0.4 µM) were dissolved in 25 µl acetone-NH_4OH (1,000:1) and applied topically to the backs of 6-wk-old animals once every two weeks for 60 wk. At the high dose, BP and the 7,8-oxide were highly carcinogenic, whereas the 4,5-oxide (K-region oxide) was weakly active and the 9,10-oxide was inactive. At the low dose, only BP was highly carcinogenic. The carcinogenic activities of the three arene oxides of BP were not correlated with their stabilities or mutagenic activities, since BP 4,5-oxide is a stable molecule and BP 7,8- and 9,10-oxides were demonstrated to be unstable.

0057 A STUDY OF CHEMICAL CARCINOGENESIS: COMPARATIVE CARCINOGENICITY OF 5-METHYLCHRYSENE, BENZO(A)PYRENE, AND MODIFIED CHRYSENES.

(Eng.) Hecht, S. S. (American Health Foundation, Valhalla, NY 10595); Loy, M.; Maronpot, R. R.; Hoffmann, D. *Cancer Lett* 1(3): 147-153; 1976.

The carcinogenic activity of 5-methylchrysene (5-MeC) was assayed in the connective tissue of C-57 black mice, and was compared to benzo(a)pyrene (BaP) and certain modified chrysene derivatives for tumorigenic activity on mouse skin. Injections of 5-MeC sc (total dose, 0.5 mg) resulted in 22 sarcoma-bearing animals in a group of 25. On mouse skin, 5-MeC and BaP had comparable complete carcinogenic activity, and 5-MeC was a stronger tumor initiator than BaP. Compared to 5-MeC, 12-fluoro-5-methylchrysene was a weaker tumor initiator on mouse skin, while 5-methoxychrysene was somewhat less active. 1-Fluoro-4-methylchrysene and 6-methoxy-5-methylchrysene lacked significant tumor-initiating activity.

0058 ARYL HYDROCARBON HYDROXYLASE INDUCTION IN MAMMALIAN LIVER-DERIVED CELL CULTURES. EFFECTS OF VARIOUS METABOLIC INHIBITORS ON THE ENZYME ACTIVITY IN HEPATOMA CELLS.

(Eng.) Owens, I. S. (Natl. Inst. Child Health and Human Development, Natl. Inst. Health, Bethesda, MD 20014); Nebert, D. W. *Biochem. Pharmacol* 25(7): 805-813; 1976.

Aryl hydrocarbon (benzo[a]pyrene) hydroxylase induction in one mouse hepatoma and two rat hepatoma cell lines was characterized with respect to optimal growth requirements and optimal inducing concentrations of phenobarbital, biogenic amines, and other hydrophobic compounds. Cordycepin, ethidium bromide, and puromycin aminonucleoside treatment of the mouse tumor line Hepa-1 produced strikingly different effects on the kinetics of hydroxylase induction, when the inducers benzo[a]-anthracene, phenobarbital, and isoproterenol were compared. Without any of these 'usual inducers' present in the mouse hepatoma cell line, 0.50-5.0 mM puromycin aminonucleoside or 40 nM actinomycin D caused large increases in the hydroxylase activity (at a time when gross RNA synthesis was virtually 100% inhibited and gross protein synthesis was more than 50% inhibited). This aminonucleoside- or actinomycin D-mediated induction proceeded without prior treatment with the usual inducers, and hence presumably without prior accumulation of putative induction-specific RNA. Moreover, this induction process apparently requires little, or no, simultaneous RNA synthesis during exposure to the aminonucleoside or actinomycin D. In contrast, when primary cultures derived from normal rat liver were treated with similar high concentrations of the aminonucleoside, no induction of the hydroxylase activity occurred. This result suggests that the effect of puromycin aminonucleoside on hydroxylase-specific messengerRNA synthesis is very different between the hepatoma cell line and normal fetal rat primary hepatocytes in culture.

)59 POSTNATAL DEVELOPMENT OF MIXED-FUNCTION
OXIDATION AS MEASURED IN MICROSOMES FROM
HE SMALL INTESTINE AND LIVER OF RABBITS. (Eng.)
redger, J. M. (Natl. Inst. Environmental Health
ciences, P.O. Box 12233, Res. Triangle Park, NC
7709); Chhabra, R. S.; Fouts, J. R. *Drug Metab
ispos* 4(1): 17-24; 1976.

ie postnatal development of aminopyrine N-demethyl-
se, aniline 4-hydroxylase, benzpyrene hydroxylase,
iphenyl 4-hydroxylase, 7-ethoxycoumarin O-deethyl-
se activities, NADPH-cytochrome c reductase, and
ytochrome P-450 was compared in microsomes from
ie liver and small intestine of New Zealand white
ıbbits. Apart from hepatic aniline hydroxylase
tivity, all of the xenobiotic-metabolizing enzyme
tivities examined had a similar pattern of
velopment in the liver and the small intestine.
ı both tissues the ability to metabolize xeno-
otics was generally undetectable at two days of
e and remained relatively low for the first 20
ys of life. Thereafter, a rapid two-to-five-fold
crease in all the enzyme activities studied was
ted, and adult values were reached or exceeded
30 days of age. Subsequent development of xeno-
otic-metabolizing enzyme activities in the small
testine, but not in the liver, exhibited a tran-
ent fall at 50 days of age before adult activ-
ies were attained after 75 days of age. The
velopmental pattern of cytochrome P-450 in the
all intestine closely resembled that of the
nobiotic-metabolizing enzyme activities, but in
e liver this correlation was less exact.

60 THE INFLUENCE OF RETINYL ACETATE ON THE
POSTINITIATION PHASE OF PRENEOPLASTIC
NG NODULES IN RATS. (Eng.) Nettesheim, P. (Bi-
ogy Div., Oak Ridge Natl. Lab., Oak Ridge, TN);
ne, M. V.; Sydner, C. *Cancer Res* 36(3): 996-
)2; 1976.

e effects of retinyl acetate (RA) on the develop-
nt of carcinogen-induced metaplastic lung nodules
re investigated in female F344 rats. Four mg of
ethylcholanthrene (3-MCA) were administered
ratracheally to rats maintained on a vitamin A-
e diet and receiving 31.4 nmoles of RA/wk by
ragastric intubation. At three, five, and 10 wk
er intratracheal instillation of 3-MCA, one
up of 24 rats each was started on a weekly dose
31,400 nmoles of RA; a control group was con-
ued on the low-RA dose. At three wk, no meta-
sias were detected but by 10 wk, squamous meta-
sias were evident in five 3-MCA-treated rats.
ty-two wk after 3-MCA injection the incidence
metaplastic lung nodules was found to be 3% in
combined high-RA-dose groups as compared with
in the low-RA-dose group. It is concluded that
has a significant effect on the postinitiation
se of preneoplastic lung nodules in rats.

1 THE INFLUENCE OF VITAMIN A ON THE SUSCEP-
TIBILITY OF THE RAT LUNG TO 3-METHYL-
LANTHRENE. (Eng) Nettesheim, P. (Biology Div., Oak Ridge Natl. Lab., Oak Ridge, TN 37830); Williams, M. L. *Int J Cancer* 17(3): 351-357; 1976.

The susceptibility of rats (female Fisher 344) to pulmonary carcinogens is increased in the absence of vitamin A intake even when considerable amounts (0.4 nmole/mg) of vitamin A are stored in the liver and deficiency symptoms are absent. This was demonstrated in studies on the induction of metaplastic lung nodules by intratracheally administered 3-methylcholanthrene. Only moderate amounts of all-trans-retinyl acetate in the diet (7.6 nmole/g of diet) were required to prevent the development of this state of enhanced susceptibility. A further increase in intake of retinoids (by intragastric administration of either all-trans-retinyl acetate or 13-cis-retinoic acid) provided no additional protection against the effects of carcinogen.

0062 ANTITUMOR EFFECT OF PROTEIN-BOUND POLYSACCHARIDE PREPARATION, PS-K, AGAINST 3-METHYLCHOLANTHRENE-INDUCED FIBROSARCOMA IN C57BL/6 MICE. (Eng.) Ohno, R. (Nagoya Univ. Sch. Medicine, 65 Tsurumai-cho, Showa-ku, Nagoya 466, Japan); Imai, K.; Yokomaku, S.; Yamada, K. *Gann* 66(6): 679-681; 1975.

The protein-bound polysaccharide preparation PS-K was found to possess an antitumor effect against 3-methylcholanthrene-induced fibrosarcoma in female C57BL/6 mice. Seven mice were injected ip with 150 or 300 mg/kg of PS-K daily either for 7 days before or 7 days after tumor injection (1×10^5 cells). Ten days after inoculation, 5 of 7 control mice had tumors, while none of the PS-K-treated animals did. Palpable tumors appeared in all mice 14 days after inoculation. The size of the growing tumors was always smaller in the pretreatment groups that received 150 or 300 mg/kg and in those given 150 mg/kg in the posttreatment group. Thus, PS-K delayed the appearance of 3-methylcholanthrene-induced fibrosarcomas and retarded their growth. Because these tumors were proved to possess tumor-specific transplantation antigens, PS-K might have potential immunity against the tumor-specific antigen.

0063 INCREASE IN TYPE A VIRUS PARTICLES INDUCED IN BALB/C MOUSE EPIDERMIS DURING CHEMICAL CARCINOGENESIS. (Eng.) Bibby, M. C. (Tobacco Res. Council Lab., Otley Road, Harrowgate, Yorkshire HG3 1PY, England); Smith, G. M. *Br J Cancer* 32(6): 660-666; 1975.

Ultrastructural studies of normal BALB/c mouse epidermis revealed the presence of isolated intracisternal A particles. Hyperplasia, papilloma and carcinoma formation induced by topical application of the polycyclic hydrocarbons benzo(a)pyrene and 3-methylcholanthrene was accompanied by an increase in the number of A particles. Topical application of a non-carcinogenic irritant α-pinene failed to provide comparable changes. Examination of the nuclei indicated occasional electron dense granules in the nucleoplasm which became more common throughout the progression of carcinogenesis. The results suggest a direct relationship between A particle proliferation and neoplastic transformation of BALB/c mouse epidermis.

0064 CARCINOGENESIS BY CARBAMIC ACID ESTERS AND THEIR BINDING TO DNA. (Eng.) Pound, A. W. (Dept. Pathology, Univ. Queensland, Brisbane, Australia); Lawson, T. A. *Cancer Res* 36(3): 1101-1107; 1976.

The tumor-initiating potency of three simple alkyl carbamates and mono-N-substituted ethyl carbamates was examined in Hall strain mice. The binding of ^{14}C-labeled carbamates to DNA was measured in Crackenbush mice. Ethyl carbamate (5.6 mEq/kg, ip) was the most potent carcinogen for the epidermis, liver, and lung, followed by its N-alkyl derivatives. Methyl carbamate (27 mEq/kg, ip) was without effect, but n-propyl (7.7 mEq/kg) and n-butyl (3.4 mEq/kg) derivatives were possible carcinogens. The ethyl esters bound to a greater extent to DNA in liver and skin than the methyl, n-propyl, and n-butyl esters and only this binding persisted. A preliminary application of 0.075% (vol/vol) croton oil increased the yield of skin tumors but not of liver or lung tumors. It also increased the binding of the alkyl carbamates to DNA in skin, the increase being greatest with ethyl carbamate. The binding persisted longer in treated than in non-croton oil-treated mice. The authors conclude that strain differences did not influence any of the interpretations derived from the present data.

0065 EFFECTS OF X-RADIATION AND URETHANE ON SURVIVAL AND TUMOR INDUCTION IN THREE STRAINS OF RATS. (Eng.) Myers, D. K. (Biology and Health Physics Div., Chalk River Nuclear Lab., Chalk River, Ontario KOJ 1JO, Canada). *Radiat Res* 65(2): 292-303; 1976.

Groups of Sprague-Dawley, Long-Evans, and Collip rats were exposed at 5-10 wk of age to repeated high doses of x-irradiation alone, urethane alone, or x-radiation plus urethane at the same time. Cumulative mortality and tumor incidence were measured until the animals reached 17 mo of age. The final cumulative incidence of mammary tumors was highest in the Sprague-Dawley rats and lowest in the Collip rats, while the final cumulative incidence of skin tumors and fatal lymphatic disorders showed the opposite trend. X-irradiation and urethane together produced more lymphatic disorders but fewer skin and mammary tumors than expected from the sum of the effects of the two agents separately in Collip rats. However, these results were not always paralleled by those obtained in the other two strains of rats. The cumulative mortality curves for all three strains of rats tested suggest that the overall carcinogenic stimulus and life-shortening effect of x-irradiation and urethane together was not greater than the sum of their separate effects at the dosage levels studied.

0066 GAS CHROMATOGRAPHIC ANALYSIS OF CARCINOGENIC NITROSAMINES IN SOIL. (Eng.) Pancholy, S. K. (Langston Univ., Langston, OK 73050). *Soil Biol Biochem* 8(1): 75-76; 1976.

A combined continuous distillation and extraction apparatus was developed to detect low concentrations of nitrosamines in soil and natural water bodies which could be hazardous to man and animals. The nitrosamines tested were dimethylnitrosamine, diethylnitrosamine, dipropylnitrosamine and dibutyl nitrosamine (individually and in combination). The recovery of nitrosamines from various experimental soils was about 90 ± 5% for most of the concentrations. The nitrosamine yield did not increase significantly when the samples were distilled for more than 3 hr. Differences due to soil texture and soil pH were not significant. This method is a rapid and sensitive way to detect nitrosamines which possibly form in soil and natural bodies of water that contain nitrates and nitrites.

0067 HISTOGENESIS OF TUMORS FROM THE NASAL CAVITIES INDUCED BY DIETHYLNITROSAMINE. (Eng.) Cardesa, A. (Univ. Nebraska Medical Center, 42nd and Dewey Ave., Omaha, NB 68105); Pour, P.; Haas, H.; Althoff, J.; Mohr, U. *Cancer* 37(1): 346-355; 1976.

The effect of changes in dose and route of administration of a carcinogen diethylnitrosamine (DEN) on the incidence and morphology of tumors developing in the nasal cavity of gerbils (*Meriones unguiculatus*) was investigated. Chronic sc (40 gerbils, administered once weekly for life at doses related to the LD50: 24, 12, and 6 mg/kg body weight/dose level) or single iv (20 gerbils received one injection of 100 or 50 mg/kg body weight) injections of DEN induced carcinomas of the nasal cavities in high incidence. The neoplasms were multifocal in origin, frequently showing mixed cellular patterns of the following cell types: large cuboidal cells, nonciliated columnar cells, ciliated columnar cells, small cells, and squamous epithelial cells. No sensory cells of the olfactory mucosa or neurofibrillar differentiations were found in these neoplasms, although several showed rosette and pseudorosette-like formations. Dose and route of administration influenced the site of origin and the patterns of cellularity of these tumors. Chronic sc injections resulted in carcinomas of the olfactory region, mostly composed of large cuboidal cells, while single iv injections led to the development of carcinomas mainly originating from the respiratory-olfactory mucosal junction and composed preferentially of nonciliated and ciliated columnar cells. These data provide support for the view that nitrosamines mainly produce epithelial tumors.

58 DIMETHYLNITROSAMINE-DEMETHYLASE: MOLECULAR SIZE-DEPENDENCE OF REPRESSION BY
LYNUCLEAR HYDROCARBONS. NONHYDROCARBON REPRES-
RS. (Eng.) Arcos, J. C. (Seamen's Medical Res.
., U.S. Public Health Service Hosp., New Or-
ns, LA); Valle, R. T.; Bryant, G. M.; Buu-Hoi,
P.; Argus, M. F. *J Toxicol Environ Health* 1(3):
-408; 1976.

dies with 58 polynuclear aromatic hydrocarbons
wed that to repress methylation of dimethylnit-
amine (DMN) in rat liver, the hydrocarbons must
isfy specific requirements of size, shape, and
lanarity. For these planar compounds the size
maximal repressor activity ranged between 85
150 A. These demethylase assays used 4 mM
strate. Later work indicates that there are two
enzymes, one assayed at substrate concentrations
ow 5 mM, and one assayed above 35 mM. Circular-
shaped and/or highly symmetrical hydrocarbons,
h as coronene, triphenylene, ovalene, and tetra-
zonaphthalene had very low activity or none, in
te of being in the optimum size range. Co-
narity of the molecule is a critical require-
t; thus, 9,10-dimethyl-1,2-benzanthracene was
ctive as repressor of DMN-demethylase synthesis.
exceptions, fluoranthene and benzo(ghi)fluoran-
ne, showed significant induction of DMN-demethyl-
. The molecular size distribution of hydrocar-
s that repress the DMN-demethylase shows a
ror-image relationship with respect to the
orted molecular size requirement for induction
azo dye N-demethylase. Compounds other than
rocarbons also showed the mirror-image relation-
p: pregnenolone-16α-carbonitrile, α- and β-
hthoflavone, and Aroclor 1254 were strong re-
ssors of DMN-demethylase. Aminoacetonitrile, a
ong inhibitor of carcinogenesis by DMN, also
ressed DMN-demethylase. The enzyme was inhibited
pretreatment of the animals with cobaltous
oride. Pregnenolone-16α-carbonitrile and 3-
ylcholanthrene, despite their similarity of
ion on DMN-demethylase, had different effects
azo reductase, which was repressed by the for-
and induced by the latter compound.

THE REPRESSION AND DEREPRESSION OF HEPATIC TYROSINE AMINOTRANSFERASE BY CARCINO-
. (Eng.) Hanausek-Walaszek, M. (Inst. Oncology,
100 Gliwice, Poland); Schumm, D. E.; Webb, T.
hem Biol Interact 12(3/4): 391-401; 1976.

ingle carcinogenic dose of dimethylnitrosamine
mg/kg) initiated the induction cycle for hep-
tyrosine aminotransferase in adrenalectomized
Sprague-Dawley rats. Following this initial
ction in the presence of dimethylnitrosamine,
enzyme became refractory to reinduction by
n inducers. The administration of thioacet-
e to either adrenalectomized or intact rats
to an immediate and progressive loss of in-
bility by hydrocortisone, dibutyrylcyclic AMP
imethylnitrosamine. Although the thioacetamide-
ced repression was not reversed even ten weeks
r cessation of treatment, it was reversed
r the induction of liver regeneration. Both
the carcinogen-mediated induction and repression of tyrosine aminotransferase appeared to occur by mechanisms not involving the corticosteroid-binding proteins that normally mediate the induction by glucocorticoids.

0070 A FURTHER PANCREATIC CARCINOGEN IN SYRIAN GOLDEN HAMSTERS: N-NITROSO-BIS(2-ACETOXYPROPYL)AMINE. (Eng.) Pour, P. (Univ. Nebraska Medical Center, 42nd and Dewey Ave., Omaha, NB 68105); Althoff, J.; Gingell, R.; Kupper, R.; Kruger, F. W.; Mohr, U. *Cancer Lett* 1(4): 197-202; 1976.

Weekly sc injections of N-nitroso-bis(2-acetoxypropyl)amine (BAP) (700 mg/kg) for 20 wk to Syrian golden hamsters induced pancreatic neoplasms in 53% of the animals, as early as 15 wk from the start of treatment. The carcinogenic potency and organotropic spectrum of BAP were similar to those of N-nitroso-bis(2-hydroxypropyl)amine (BHP). Metabolism studies indicated that BAP was readily converted in vivo to BHP and that BHP was also the major urinary metabolite. The findings indicate that the biological effect of BAP is different from that of analogous hydroxylated and acetylated nitrosamines.

0071 INDUCTION OF OVALBUMIN AND CONALBUMIN SYNTHESIS IN IMMATURE CHICK OVIDUCTS BY ETHIONINE. (Eng.) Sharma, O. K.; (Univ. Colorado Medical Center, Denver, CO 80220); Borek, E.; Martinez-Hernandez, A. *Nature* 259(5544): 588-591; 1976.

To monitor the effectiveness of the deprivation of methyl groups by the administration of ethionine, the synthesis of hormone-induced ovalbumin in immature chick oviducts was followed. Four-day-old Calhorn chicks were injected with 1 mg estradiol benzoate for ten days. After 3-4 wk, the chicks were injected ip with L-ethionine or methionine (0.25 mg/g) and/or adenine (0.12 mg/g) for 5-7 days. Homogenates of the magnum portions of the oviducts were centrifuged at 100,000 x g, and analyzed. Ethionine alone induced ovalbumin synthesis, although a combination of ethionine and adenine was more effective. Adenine alone and in combination with methionine did not induce ovalbumin synthesis. Conalbumin synthesis was also induced by ethionine as measured by precipitation with monospecific antiserum to conalbumin. Induction of ovalbumin and conalbumin synthesis was confirmed by sodium dodecyl sulphate-acrylamide gel electrophoresis. Electron microscopy of the oviducts of ethionine-treated chicks revealed basally-located glandular cell nuclei, well developed endoplasmic reticulum and Golgi complex, and prominent electron-dense secretory glanules; the cells of estradiol-treated animals were similar, with better developed endoplasmic reticulum and Golgi complexes. Induction of ovalbumin and conalbumin synthesis by ethionine was not observed in the ''primitive oviduct'' of chicks (5-6 wk old) that had not received primary stimulation with estrogen. This suggests that ethionine alone cannot cause cytodifferentiation and growth of the primitive oviduct, but that in tissues already differentiated by the action of estradiol it can induce the further cellular differentiation needed for specific protein synthesis.

0072 PHARMACODYNAMICS AND UPTAKE OF VINYL CHLORIDE MONOMER ADMINISTERED BY VARIOUS ROUTES TO RATS. (Eng.) Withey, J. R. (Bureau Chemical Safety [Foods], Health Protection Branch, Ottawa, Canada). *J Toxicol Environ Health* 1(3): 381-394; 1976.

To assess the hazard presented by the oral ingestion of vinyl chloride monomer, rats that had been surgically prepared with an indwelling jugular cannula were dosed by intragastric intubation with aqueous solutions containing up to 2.0 mg/ml vinyl chloride. Time-concentration curves were obtained from sequential samples of blood. The uptake of vinyl chloride by this route was found to be extremely rapid; peak concentrations were achieved less than 10 min after administration of the dose. Elimination from the blood compartment appeared to be biexponential. The distribution and elimination rates of vinyl chloride from the blood were also determined from the blood concentration data after the administration of an intravenous dose of aqueous or vegetable oil solution. Studies with the same animal model in a single restraint cage that allowed a ''head only'' exposure to concentrations of vinyl chloride up to 7,000 ppm in the gas phase have shown a similar rapid uptake followed by a plateau blood concentration during several hours of exposure. On removal from the vinyl chloride atmosphere, blood levels fell rapidly to barely detectable concentrations after 2 hr. Thus subsequent monitoring would not be a reliable indicator of exposure. Uptake profiles after oral dosage were extremely variable.

0073 A SURFACE-ACTIVE AGENT INVOLVED IN PVC-INDUCED HAEMOLYSIS. (Eng.) Richards, R. J. (Dept. Biochemistry, University Coll., Cardiff CF1 1XL, UK); Desai, R.; Rose, F. A. *Nature* 260 (5546): 53-54; 1976.

A range of polyvinyl chloride (PVC) samples was tested for hemolytic activity. All the paste polymers showed some hemolytic activity although this was low when a certain detergent (code C) was present. Strong hemolytic potential was found for PVC paste polymers containing code B detergent, sodium dodecyl benzene sulfonate. Paste polymers with sodium lauryl sulfate produced significant hemolysis but were not as active as those with code B detergent. The hemolytic activity of paste polymers with code A detergent was dependent on the particle size of the PVC sample; the total concentration of the detergents used with the particles; and the presence of additives and other detergents. Suspension PVC homopolymers had little, if any, hemolytic potential, whereas paste or emulsion powders produced hemolysis (probably because of the presence of ionic detergent on their surfaces). The results also showed that certain detergents such as sodium dodecyl benzene sulfonate form a tight association with PVC particles to form highly reactive membrane-lytic agents.

0074 LACK OF DIRECT CORRELATION AMONG REPAIR, ONCOGENESIS, AND LETHALITY IN CULTURED SYNCHRONIZED MOUSE FIBROBLASTS TREATED WITH N-METHYL-N'-NITRO-N-NITROSOGUANIDINE. (Eng.) Bertram, J. S.; Peterson, A. R.; Heidelberger, C. In: *Molecular Mechanisms for Repair of DNA. Basic Life Sciences*, vol. 5B. Edited by Hanawalt, P. C.; Setlow, R. B. New York, Plenum Press, 1975, pp. 789-792.

The repair of single-strand breaks induced by N-methyl-N'-nitro-N-nitrosoguanidine (MNNG) in mouse embryo fibroblast DNA was studied using an alkaline sucrose sedimentation procedure with cells synchronized by arginine deprivation. In parallel studies in synchronized cells, the effects of MNNG on malignant transformation and cell death were examined. Cells in late G_1 were maximally transformed, while cells in S-phase were maximally killed; by contrast, the repair capacity in both cases was similarly rapid. Arginine-deprived cells showed a low level of DNA repair, but the extent of cell death and transformation was comparable to that in rapidly repairing cells in G_1 and S, respectively. Thus, in this system there is no direct correlation among DNA repair, cell transformation, and lethality.

0075 EFFECT OF VITAMIN A DEFICIENCY ON RAT COLON CARCINOGENESIS BY N-METHYL-N-NITRO-N-NITROSOGUANIDINE.. (Eng.) Narisawa, T. (American Health Foundation, Valhalla, NY 10595); Reddy, B. S.; Wong, C. Q.; Weisburger, J. H. *Cancer Res* 36(4): 1379-1383; 1976.

The effect of vitamin A deficiency on the sensitivity of the colon to the carcinogenic effect of intravectally administered N-methyl-N'-nitro-N-nitrosoguanidine (MNNG), was studied in female Fischer rats. Animals maintained on Purina laboratory chow, semipurified vitamin A-free diet, or semipurified vitamin A-supplemented diet were given 1.25, 0.63, or 0.31 mg MNNG three times weekly for 30 wk and autopsied at the 45th wk. The number of large bowel tumors per tumor-bearing rat was higher in animals receiving 1.25 mg MNNG compared to those given 0.63 or 0.31 mg. Vitamin A deficiency in rats given 1.25 mg MNNG significantly suppressed the large bowel tumor induction, as demonstrated by comparison with rats fed Vitamin A. A high incidence of squamous cell papillomatosis of the urinary bladder was observed in rats fed vitamin A-free diet and given 1.25 mg MNNG.

e results suggest that the large intestine has a
sceptibility, different from that of the res-
ratory and urinary tracts, to tumorigenic stimula-
on in vitamin A-deficient status.

76 AUTORADIOGRAPHIC STUDIES ON THE DISTRIBU-
TION OF ^{14}C-1,2-DIMETHYLHYDRAZINE DIHYDRO-
LORIDE AND ITS EFFECT ON DNA SYNTHESIS IN SWISS
CE. (Eng.) Shimizu, H. (Jikei Univ. Sch. Med-
ine, Nishishinbashi 3-25-8, Minato-ku, Tokyo 105,
pan); Toth, B. *Gann* 66(6): 589-601; 1975.

ght microscopic autoradiographic studies were
de on the distribution of ^{14}C-1,2-dimethylhydra-
ne dihydrochloride in Swiss mice and on the
fect of 1,2-dimethylhydrazine dihydrochloride on
A synthesis, using the ^{3}H-thymidine incorporation
chnique. In the first study, ^{14}C-1,2-dimethyl-
drazine dihydrochloride was administered sc or
. Large amounts of silver grains were found in
patocytes and substantially lower amounts of
lver grains were observed in the endothelial
lls and epithelial cells of colon. In the second
udy, repeated injections or po administrations
1,2-dimethylhydrazine dihydrochloride were
ven to mice which subsequently received ^{3}H-thy-
dine treatment. A somewhat higher amount of
midine incorporation in DNA was noted in the
thelial cells of the colon of sc and po treated
e at two occasions and a substantially higher
unt in the endothelial cells of blood vessels
liver of mice treated by both routes than in
corresponding controls. In three instances,
ever, the amount of incorporation decreased; in
hepatocytes and endothelium at 1 wk and 24 hr,
pectively, after po treatment, and in the epi-
lium of the colon at 3 mo, after sc administra-
n. In the mice treated with 1,2-dimethylhydra-
e dihydrochloride, a significantly high amount
^{3}H-thymidine incorporation was observed in the
othelial cells of blood vessels in liver from
ch tumors later arose. A somewhat high level of
orporation was also observed in the hepatocytes
which tumor did not develop. In the epithelial
ls of the colon, no apparent relationship could
seen between these events. No association was
n in the distribution of ^{14}C-1,2-dimethylhydra-
e dihydrochloride and tumor development in
ious cells.

7 EFFECT OF QUALITY AND QUANTITY OF DIETARY
FAT AND DIMETHYLHYDRAZINE IN COLON CAR-
GENESIS IN RATS. (Eng.) Reddy, B. S. (American
lth Foundation, Valhalla, NY 10595); Narisawa,
Vukusich, D.; Weisburger, J. H.; Wynder, E. L.
Soc Exp Biol Med 151(2): 237-239; 1976.

effect of quality and quantity of dietary fat
colon tumor induction by 1,2-dimethylhydrazine
) was studied in weanling female Fischer rats.
rats were fed diets containing corn oil (un-
rated) or lard (saturated), at concentrations
% or 20%. Those fed either fat at the 20% concentration and treated with DMH had a higher incidence of colon tumors than did those fed at the 5% concentrations or those fed on control diets. Rats fed 5% corn oil had a slightly higher tumor incidence than those fed 5% lard. It is concluded that rats fed a high fat diet are more susceptible to colon tumor induction by DMH than those fed normal diets.

0078 EVIDENCE OF REPAIR OF DNA DAMAGE INDUCED BY 4-HYDROXYAMINOQUINOLINE 1-OXIDE IN GUINEA PIG PANCREATIC SLICES IN VITRO. (Eng.) Iqbal, Z. M. (Case Western Reserve Univ. Sch. Medicine, Cleveland, OH 44106); Majdan, M.; Epstein, S. S. *Cancer Res* 36(3): 1108-1113; 1976.

The effect of in vitro exposure of guinea pig pancreatic slices to 4-hydroxyaminoquinoline 1-oxide (HAQO) was studied. HAQO exposure resulted in increased [methyl-^{3}H]thymidine ([^{3}H]TdR) incorporation into DNA, both in the presence and absence of 5 mM hydroxyurea (HU). Normal DNA replicative synthesis, but not DNA repair synthesis, was suppressed by HU. The increase in [^{3}H]TdR incorporation into DNA, in the presence of HU, represented DNA repair synthesis in response to DNA damage induced by HAQO. Exposure of pancreatic slices to 10^{-6} to 10^{-5} M concentrations of HAQO did not significantly increase thymidine incorporation; however, a 15-min exposure to 10^{-4} M HAQO induced a significant increase in HU-insensitive [^{3}H]Tdr incorporation into DNA. Kinetics of [^{3}H]TdR incorporation suggests that most of the DNA repair synthesis occurred during the two hours following HAQO-induced DNA damage.

0079 LOSS OF MITOCHONDRIAL DNA IN RESPIRATION-DEFICIENT MUTANT OF YEAST INDUCED BY 4-NITROQUINOLINE 1-OXIDE. (Eng.) Morita, T. (Shizuoka Coll. Pharmacy, Oshika 2-2-1, Shizuoka 422, Japan); Fukunaga, M.; Mifuchi, I. *Gann* 66(6): 697-700; 1976.

Loss of mitochondrial DNA was found in a cytoplasmic respiration-deficient mutant of yeast, strain N-1, induced by treatment of a normal yeast with 4-nitroquinoline 1-oxide. In cesium chloride density gradient centrifugation, mitochondrial DNA from the normal yeast showed a density of 1.684 g/ml, but mitochondrial fraction of respiration-deficient mutant strain N-1 had no detectable radioactivity in its mitochondrial fraction. It is concluded that respiration-deficient mutant strain N-1 lost its mitochondrial DNA which is indispensible for yeast cell respiratory activity.

0080 SELENIUM IN FLY ASH. (Eng.) Gutenmann, W. H. (Dept. Food Science, Cornell Univ., Ithaca, NY 14853); Bache, C. A.; Youngs, W. D.; Lisk, D. J. *Science* 191(4230): 966-967; 1976.

The possibility that selenium in fly ash could be taken up by plants and animals in areas where fly ash is used agriculturally to amend soil was investigated. Studies on clover growing on landfill sites, on vegetables growing in pots of soil containing 10% fly ash, and on farm pond near a fly ash containing landfill, showed that selenium is leachable, soluble, and available for uptake by plants and animals. In the farm pond study, all plants and animals tested showed higher concentrations of selenium in their tissues than those from a control pond. It was stressed that the movement of selenium through the environment requires further study because of the volatility of this element.

0081 RELATIONSHIP BETWEEN SERUM SELENIUM LEVELS AND PATIENTS WITH CARCINOMA. (Eng.) Broghamer, W. L. (Veterans Admin. Hosp., Zorn Ave., Louisville, KY 40202); McConnell, K. P.; Blotcky, A. L. *Cancer* 37(3): 1384-1388; 1976.

Serum selenium levels were determined by neutron activation analysis in 110 patients with carcinoma. An attempt was made to correlate the wide range in the serum concentrations of the trace element with various parameters; serum selenium levels were associated with patient survival time, incidence of multiple primary malignancies, rate of recurrence of the primary lesion, and the extent of local and disseminated involvement.

0082 EFFECT OF CHROMATES ON CILIATED CELLS OF RAT TRACHEAL EPITHELIUM. (Eng.) Mass, M. J. (Health Sciences Center, State Univ. New York, Stony Brook, NY 11794); Lane, B. P. *Arch Environ Health* 31(2): 96-100; 1976.

Specific subcellular effects of exposure to chromates that might be the basis for observed pathologic findings were assessed in tracheal organ culture and excised whole tracheas from female Wistar-Lewis rats. Chromate concentrations of 10 mg/ml or more were found to induce ciliostasis within 20 minutes and to kill cells within 24 hours. Levels between 10 μg/ml and 100 μg/ml were not ciliostatic but resulted in cytotoxicity after a delay of several hours. Ultrastructural alterations associated with chromate-induced cytotoxicity are similar to the progressive degenerative changes that result from other chemical injuries. An inhibitory effect of chromate on protein synthesis, RNA synthesis, or succinic dehydrogenase activity could not be demonstrated. The data suggest that damage to the plasmalemma by chromates may be responsible for the observed change.

0083 PREPARATIVE ACTION OF CARBON TETRACHLORIDE IN LIVER TUMORIGENESIS BY A SINGLE APPLICATION OF N-BUTYLNITROSOUREA IN MALE ICR/JCL STRAIN MICE. (Eng.) Takizawa, S. (Res. Inst. Nuclear Medicine and Biology, Hiroshima Univ., Kasumi 1-2-3, Hiroshima 734, Japan); Watanabe, H.; Naito, Y.; Inoue, S. *Gann* 66(6): 603-614; 1975.

A dose of 10 or 20 mg of N-butylnitrosourea (BNU) dissolved in 50% ethanol was administered by a gastric tube to 6-wk-old male ICR/JCL strain mice and they were sacrificed 15 mo later. One of 18 animals developed a hepatoma, but none of the mice given CCl_4 in 0.1 ml of 50% olive oil sc developed hepatoma. However, a marked enhancement of hepatoma induction was observed in mice injected with CCl_4 1 day before the single intragastric adminis-tration of BNU, with 12 of 28 mice developing one or more hepatomas (average 3.2/mouse) ranging in diameter from 0.5 to 1.5 cm. By extending the administration interval between CCl_4 and BNU to 1 wk or 1 mo, or by reversing the order of administr tion, the hepatotumorigenic action was virtually lost. There was no occurrence of hepatoma but a predominant development of leukemia, of either thymic or nonthymic origin, was observed in younge mice treated with CCl_4 1 day before continuous po administration of BNU (1 mg/day/mouse). It is concluded that the preparative (cocarcinogenic) action of CCl_4 is indispensable for hepatotumorigenesis with a single large dose of BNU.

0084 DESMOSTEROL IN HUMAN AND EXPERIMENTAL BRAIN TUMORS IN TISSUE CULTURE. (Eng.) Weiss, J. F. (Armed Forces Radiobiology Res. Inst. Bethesda, MD); Cravioto, H.; Bennett, K.; Weiss, E. deC.; Ransohoff, J. *Arch Neurol* 33(3): 180-182; 1976.

Desmosterol, a possible chemical indicator of brain tumors, was detected in cells of neurogenic, nitrosourea-induced rat tumors (neurinomas and gliomas, C_6 cell line) and in human astrocytomas grown in lipid-poor media. A further increase in the amount of cell desmosterol occurred when triparanol was added to media containing delipidized serum. Cholesterol was replaced almost completely by desmosterol in tumor cells grown in media containing nontoxic levels of 20,25-diazacholesterol. Desmosterol did not accumulate when these inhibitors of desmosterol-reductase were added to culture media containing cholesterol and other lipids (whole fetal calf serum). The results demon strate that cultured nervous system tumors are capable of sterol synthesis, and indicate that a central mechanism of cholesterol synthesis, which may be related to the availability of exogenous cholesterol, is operative in these cells. It is concluded that these findings are relevant to clinical studies on the use of cholesterol inhibitors as tools for the detection of brain tumor activity.

0085 CARCINOGENIC NITROSAMINES AND CELL CULTURES. (Eng.) Knox, P. (Medical Sch., Univ. Birmingham, Birmingham B15 2TJ, England). *Nature* 259(5545): 671-673; 1976.

The short term effects of two acylnitrosamides, ethylnitrosourea (ENU) and methylnitrosourea (MNU)

ere studied. Neural fetal AS rat tissue cultures
ere used; the chemical breakdown of nitrosamides
as followed spectrophotometrically. Nitrosamides
ecay rapidly, yet long exposures killed the cells;
breakdown product was sought to explain this
ytotoxicity. It was demonstrated that >97% of MNU
reaks down in culture conditions to yield meth-
nol, cyanate ions, and gaseous nitrogen. Cyanate
ons were the only possible cytotoxic agent, and
NU was also found to yield cyanate ions. Cyanate
ons were effective because of their ability to
ffect carbamylation reactions. Carbamylation of
erum proteins also occurs; it was demonstrated
hat the growth promoting properties of serum
ould be lost in this manner. BHK cells, which
row well with fetuin, were tested on fetuin car-
amylated with ENU. Above three carbamyl groups
er fetuin molecule, startling morphological
hanges appeared. It was concluded that MNU and
NU, on decomposition in culture, give rise to a
ery bioactive molecule, the cyanate ion, which
an affect the cell cycle. Low levels of protein
odification could alter biological function.

86 LIVER CELL ADENOMAS ASSOCIATED WITH USE OF ORAL CONTRACEPTIVES.

(Eng.) Edmondson,
A. (Univ. Southern California Sch. Medicine,
25 Zonal Ave., Los Angeles, CA 90033); Henderson,
; Benton, B. *N Engl J Med* 294(9): 470-472; 1976.

ring the past six years an increasing number of
ver-cell adenomas in women were diagnosed, and a
udy of possible etiologic factors, including use
oral contraceptives, was undertaken in 42 women.
ere was a significant difference between cases
d matched controls in mean months of oral con-
aceptive use: 73.4 as compared to 36.2 (P <
001). The women with adenomas took mestranol-
ntaining pills much more commonly than the con-
ols (P < 0.0001). Hemorrhage into the tumor was
ten associated with the onset of menstruation in
men taking oral contraceptives. Long-term use of
al contraceptives, especially those containing a
gh total dose of steroids or mestranol as the
nthetic estrogen, should be considered against
sks of side effects of the drugs.

7 ORAL CONTRACEPTIVES AND REDUCED RISK OF BENIGN BREAST DISEASES.

(Eng.) Ory, H.
rvard Sch. Public Health, 677 Huntington Ave.,
ton, MA 02115); Cole, P.; MacMahon, B.; Hoover,
N Engl J Med 294(8): 419-422; 1976.

1970 a questionnaire on oral-contraceptive use
mailed to 97,254 married women 25-49 yr of age
Greater Boston. Sixty-nine percent responded.
ing the subsequent 30 mo, 1072 of the women
e hospitalized for breast diseases. Among res-
dents, 659 benign and 137 malignant cases were
ntified. Among non-respondents 237 benign and
malignant cases were found. Women with breast
ease diagnosed before the study were excluded
from the analysis. Hospitalization rates for fibrocystic disease were similar for non-users of oral contraceptives and users of 1 to 12 mo duration. Users for 13 mo to 24 mo and 25 or more mo had rates only 70 and 35%, respectively, of those of nonusers. These results, and their similarity to findings in previous studies, suggest that the use of oral contraceptives appears to lower risk of fibrocystic breast disease. A similar association was seen for fibroadenoma. Rates of breast cancer were lower for users than for nonusers, but this finding was neither related to duration of use nor statistically significant.

0088 HEPATIC CHANGES IN YOUNG WOMEN INGESTING CONTRACEPTIVE STEROIDS.

(Eng.) Mays, E. T. (Alberta B. Chandler Medical Center, Univ. Kentucky, Lexington, KY 40507); Christopherson, W. M.; Mahr, M. M.; Williams, H. C. *JAMA* 235(7): 730-732; 1976.

Primary liver tumors, previously rare among women in the United States, were seen with increasing frequency after the introduction and widespread use of contraceptive steroids. The cases of 13 young women were summarized. The patients were nonalcoholic, mostly young and generally healthy. There was no history of exposure to known hepatotoxins nor any exposure in utero to diethylstilbestrol. Nine tumors were benign, and four malignant. Six tumors ruptured spontaneously. One woman died during hepatic resection for malignant hepatocellular carcinoma; in two cases of this cancer the tumors were nonresectable. In two patients a benign tumor was left in situ. An etiological link between contraceptive pills and hepatic tumors seems increasingly likely.

0089 LIVER TUMOURS AND THE PILL (Letter to Editor).

(Eng.) Christopherson, W. M. (Univ. Louisville, Sch. Medicine, Louisville, KY). *Br Med J* 4(5999): 756; 1976.

The author reports a registry of benign and malignant primary liver tumors occurring in 50 young women, most of whom had taken oral contraceptives. Most of the tumors were focal nodular hyperplasia; others were liver cell adenomas and several primary liver cell carcinomas. The infrequent incidence of benign liver tumors supports the postulated causal relationship with oral contraceptives. The author is interested in obtaining clinical resumes and histological material on cases that have come to the attention of other readers.

0090 ISOLATION AND IDENTIFICATION OF METABOLITES OF ^{14}C-LABELED ESTRADIOL IN CATTLE.

(Eng.) Kaltenbach, C. C. (Division Animal Science, Univ. Wyoming, Laramie, WY 82071); Dunn, T. G.; Koritnik, D. R.; Tucker, W. F.; Batson, D.

B.; Staigmiller, R. B.; Niswender, G. D. *J Toxicol Environ Health* 1(4): 607-616; 1976.

Six steers and six heifers received three daily sc injections containing either 200 μg (1 mg) of [4-^{14}C]estradiol-17β or 312 μCi (2.16 μg of [4-^{14}C]-estradiol-17β 3-benzoate. Major metabolites of the administered estradiol-17β and estradiol-17β 3-benzoate were identified in muscle, fat, liver, and kidney samples obtained three hours after the final injection. Estradiol benzoate was nondetectable in the tissues analyzed, suggesting rapid hydrolysis of the benzoate ester. Consequently, the relative proportions of the various metabolites were similar for both the injected estrogens. Estradiol-17β and estrone, which together accounted for 80-90% of the total extracted radioactivity, appeared to be the major metabolites in both muscle and fats. In contrast, the major metabolites present in liver and kidney appeared in the conjugate fraction. Most of the conjugated metabolites were glucuronates, which represented 85-95% of the total recovered conjugate radioactivity.

0091 CLEAR CELL ADENOCARCINOMA OF THE CERVIX AND VAGINA: A CLINICOPATHOLOGIC STUDY OF 21 CASES WITH AND WITHOUT A HISTORY OF MATERNAL INGESTION OF ESTROGENS. (Eng.) Nordqvist, S. R. B. (Univ. Miami Sch. Medicine, P.O. Box 520875, Biscayne Annex, Miami, FL 33152); Fidler, W. J., Jr.; Woodruff, J. M.; Lewis, J. L., Jr. *Cancer* 37(2): 858-871; 1976.

Twenty-one cases of clear cell adenocarcinoma of the cervix uteri and vagina were reviewed. Fifteen cases occurred in females under 25 yr of age and four in women over 45 yr. In seven cases, a positive history of maternal ingestion of diethylstilbestrol (DES) was obtained. One mother gave a history of medication with conjugated estrogens and ethisterone. Of the 13 patients with a negative history, three were born during the time period when DES was commonly used to prevent abortion. Fifteen carcinomas were cervical in origin; seven of these also involved the vagina. In six cases the carcinoma was entirely vaginal. Vaginal involvement of the carcinoma was more common in the estrogen-related group. Two non-estrogen-related cases had coexisting congenital malformations with double uterus and vagina and unilateral renal agenesis. The histopathologic appearance was similar in both groups. In most cases, a mixture of papillary, microcystic, tubular, and solid features was seen. Vaginal adenosis was found in nine cases, six of which were estrogen-related. Surgical therapy was employed in most cases and was generally superior to radiation therapy. Five patients had lymphatic involvement. All died from carcinoma. The survival rate among 16 patients followed for two years or more was 62.5%. It is suggested that DES, by virtue of being an estrogen, interferes with the normal process of differentiation and degeneration of mullerian epithelium in the fetal vagina. The persistence of mullerian cells altered at the subcellular level could form the basis for development of carcinoma in later life. However, a simila sequence of events must also be accepted to occur ''spontaneously'' since clear cell adenocarcinoma can develop in women without a history of maternal estrogens.

0092 EFFECT OF AGE AND TESTOSTERONE ON THE INDUCTION OF HYPERPLASTIC NODULES, CARCINOMAS, AND CIRRHOSIS OF THE LIVER IN RATS INGESTING N-2-FLUORENYLDIACETAMIDE. (Eng.) Reuber, M. D. (11014 Swansfield Rd., Columbia, MD 21044). *Eur J Cancer* 12(2): 137-141; 1976.

Hepatic carcinogenesis was studied in castrated A x C rats on a diet containing 0.025% N-2-fluorenyldiacetamide (F-diAA). Some groups of animals were implanted sc with testosterone propionate (20 mg/100 g) in pellets containing cholesterol. The effect of age on carcinogenesis was studied in 12- or 52-wk-old animals. The incidence of carcinomas and the number of rats with large carcinomas, multiple carcinomas, and metastases, as well as the degree and incidence of cirrhosis, was highest in the younger castrated rats given testosterone. Twelve-week-old castrated rats developed more hyperplastic nodules, carcinomas and cirrhosis than did 52-wk-old castrated animals. Testosterone increased only slightly the incidence of carcinoma hyperplastic nodules, and cirrhosis in 52-wk-old animals. Testosterone is important in F-diAA-hepatic carcinogenesis, particularly in young adult male rats. It is concluded that the restoration of the level of sex hormone in aged rats will not restore the susceptibility to hepatic carcinogenesis comparable to that of younger rats.

0093 THE ISOLATION AND IDENTIFICATION OF CHOLESTEROL 5α, 6α-EPOXIDE FROM LIVER OF HAIRLESS MICE. (Eng.) Black, H. S. (Baylor Coll. Medicine, Houston, TX 77025); Laseter, J. L. *Comp Biochem Physiol* 53C(1): 29-31; 1976.

Cholesterol 5α,6α-epoxide (CAE) was identified in and isolated from the livers of albino hairless mice. The livers were homogenized, and total lipid were extracted with chloroform-methanol. The paren compound was identified, after preparative thin-layer chromatography, by mass spectroscopy. Furthe proof of identity was obtained from radio-gas-liquid chromatography of the radioactive acetate ester derivative and the trimethylsilyl ether, Bis(trimethylsilyl)acetamide. The major fractions of radioactivity collected from gas-liquid chromatography corresponded to the mass peak of the authentic nonlabeled acetate ester of CAE. When reference cholesterol, in quantities similar to that found in liver, was subjected to the same preparative procedure used to isolate CAE, the results suggested that the CAE isolated is a natural constituent of liver and not an artifact of isolation. Approximately 80 ng of the epoxide

ere present per gram of liver. From the present
nd previous studies, it appears that CAE is a
atural constituent of hairless mouse liver, and
hat liver is capable of metabolizing this com-
ound.

094 BILIARY EXCRETION OF STERIGMATOCYSTIN BY VERVET MONKEYS. (Eng.) Steyn, M. (Natl.
es. Inst. Nutritional Diseases, P.O. Box 70,
arowvallei 7503, Republic of South Africa); Thiel,
. G. *Biochem Pharmacol* 25(3): 265-266; 1976.

he nature and extent of biliary excretion of
terigmatocystin was studied in vervet monkeys.
ne male monkey received 100 mg of ^{14}C-labeled
terigmatocystin per os, and was sacrificed 40 hr
ater. Two other male animals were given a daily
) dose of 10 mg/kg sterigmatocystin for 10 days.
ne bile of the three animals was then combined
nd analyzed by thin layer chromatography. Ap-
roximately 70% of the dose was excreted unchanged
n the feces. Over 50% of the absorbed toxin ap-
eared in the urine as sterigmatocystin glucuron-
de. About 15% of the absorbed dose was found to
e excreted via the bile, also in the glucuronide
rm. No evidence suggesting that any other con-
gates (e.g. sulfates) of sterigmatocystin were
esent in the bile was found.

95 EFFECT OF AFLATOXIN ON MITOCHONDRIAL TRANSCRIPTION AND TRANSLATION. (Eng.)
lt, J. A. (Virginia Polytechnic Inst. and State
iv., Blacksburg, VA 24061). *Diss Abstr Int B*
(8): 3915-B; 1976.

96 THE RELATIONSHIP BETWEEN THE TURNOVER OF UTP AND RNA SYNTHESIS IN CULTURED CELLS
EATED WITH AFLATOXIN B_1. (Eng.) Clifford, J. I.
niv. Coll. Hosp. Medical Sch., University St.,
ndon WC1E 6JJ, England); Garvican, L.; Rees, K.
Chem Biol Interact 13(2): 165-171; 1976.

97 EFFECT OF SODIUM ACETATE ON GROWTH AND AFLATOXIN PRODUCTION BY *ASPERGILLUS*
RASITICUS NRRL 2999. (Eng.) Buchanan, R. L., Jr.
ept. Nutrition & Food, Drexel Univ., Philadel-
ia, PA 19104); Ayres, J. C. *J Food Sci* 41(1):
8-132; 1976.

98 EXAMINATION OF SWISS CHEESE FOR INCIDENCE OF MYCOTOXIN PRODUCING MOLDS. (Eng.)
llerman, L. B. (Dept. Food Science & Technology,
iv. Nebraska, Lincoln, NE 68503). *J Food Sci*
(1): 26-28; 1976.

9 A SCREENING MEDIUM AND METHOD TO DETECT SEVERAL MYCOTOXINS IN MOLD CULTURES.
g.) Bullerman, L. B. (Dept. Food Science and
chnology, Univ. Nebraska, Lincoln, NB 68503). *J*
k Food Technol 37(1): 1-3; 1974.

0100 MAJOR LIPID CLASSES IN PLASMA MEMBRANE ISOLATED FROM LIVER OF RATS FED A HEPATOCARCINOGEN. (Eng.) Perkins, R. G. (Mayo Clinic and Medical Sch., Rochester, MN 55901); Kummerow, F. A. *Biochim Biophys Acta* 424(3): 469-480; 1976.

0101 GENETIC DIFFERENCES IN 2-ACETYLAMINOFLUORENE MUTAGENICITY IN VITRO ASSOCIATED WITH MOUSE HEPATIC ARYL HYDROCARBON HYDROXYLASE ACTIVITY INDUCED BY POLYCYCLIC AROMATIC COMPOUNDS. (Eng.) Felton, J. S. (Natl. Inst. Child Health and Human Development, Natl. Inst. Health, Bethesda, MD 20014); Nebert, D. W.; Thorgeirsson, S. S. *Mol Pharmacol* 12(2): 225-233; 1976.

0102 BRIEF COMMUNICATION: METABOLISM OF N-2-FLUORENYLACETAMIDE IN X/GF MICE: LACK OF CORRELATION BETWEEN BIOCHEMICAL INTERACTION AND CARCINOGENICITY. (Eng.) Grantham, P. H. (Carcinogen Metabolism and Toxicology Branch, Natl. Cancer Inst., Bethesda, MD 20014); Mohan, L. C.; Weisburger, E. K. *J Natl Cancer Inst* 56(3): 649-651; 1976.

0103 PROTEIN MODIFICATIONS BY ACTIVATED CARCINOGENS. II. THE ACETYLATION OF RIBONUCLEASE BY N-ACETOXY-3-FLUORENYLACETAMIDE. (Eng.) Barry, E. J. (Veterans Admin. Hosp., Univ. Minnesota, Minneapolis, MN 55417); Gutmann, H. R. *Chem Biol Interact* 13(1): 47-55; 1976.

0104 SKIN RESPONSES OF INBRED STRAINS OF MICE TO CUTANEOUS APPLICATIONS OF 7,12-DIMETHYLBENZ(A)ANTHRACENE (DBMA) (Proceedings Abstract). (Eng.) Akamatsu, Y. (Medical Coll. Georgia, Augusta, GA 30902). *IRCS Med Sci (Suppl)* 3(10): 19; 1975.

0105 CHANGES IN CATECHOLAMINE- AND GLUCAGON-RESPONSIVE ADENYLATE CYCLASE ACTIVITY IN PRENEOPLASTIC RAT LIVER. (Eng.) Boyd, H. (Univ. Miami Sch. Medicine, Miami, FL 33152); Martin, T. J. *Mol Pharmacol* 12(2): 195-202; 1976.

0106 THE FRACTIONATION OF ISOLATED LIVER CELLS FROM NORMAL AND CARCINOGEN TREATED RATS. (Eng.) Horsfall, A. C. (Mathilda and Terence Kennedy Inst. Rheumatology, Bute Gardens, London W6 7DW, England); Ketterer, B. *Br J Cancer* 33(1): 96-104; 1976.

0107 THE EFFECTS OF BENZOPYRENE AND SAFROLE ON BIPHENYL 2-HYDROXYLASE AND OTHER DRUG-METABOLIZING ENZYMES. (Eng.) McPherson, F. J. (Dept. Biochemistry, Smith, Kline and French Ltd., Welwyn Garden City, Herts. AL7 1EY, U.K.); Bridges, J. W.; Parke, D. V. *Biochem J* 154(3): 773-780; 1976.

0108 ON THE SELECTIVITY OF ARYL HYDROCARBON HYDROXYLASE INDUCTION AFTER 3-METHYLCHOLANTHRENE PRETREATMENT. (Eng.) Kleeberg, U. (Friedrich-Schiller-University Jena, 69 Jena, GDR); Barth, A.; Roth, J.; Klinger, W. *Acta Biol Med Ger* 34(10): 1701-1705; 1975.

0109 EFFECTS OF IN VITRO BINDING OF 3,4-BENZPYRENE ON CHROMATIN STRUCTURE AND COMPOSITION. (Eng.) Na, C. (Boston Univ. Graduate Sch., Boston, MA 02215). *Diss Abstr Int B* 36(8): 3931-3932-B; 1976.

0110 APPROACHES TO THE STANDARDIZATION OF CARCINOGENIC SUBSTANCES IN THE ENVIRONMENT. (Rus.) Albert, R. E. (Inst. Environmental Hygiene, New York Univ. Medical Center, New York, NY); Altshuler, B.; Freedman, L.; Ianysheva, N. Ia.; Antomonov, Iu. G. *Gig Sanit* (10): 84-90; 1975.

0111 THE CONVERSION OF BENZO[a]PYRENE 4,5-OXIDE INTO 4-HYDROXYBENZO[a]PYRENE IN THE PRESENCE OF POLYRIBOGUANYLIC ACID. (Eng.) Murray, A. W. (Inst. Cancer Res: Royal Cancer Hosp., London SW3 6JB, Great Britain); Grover, P. L.; Sims, P. *Chem Biol Interact* 13(1): 57-66; 1976.

0112 THE ISOMERIC 9,10-OXIDES OF *TRANS*-7,8-DIHYDROXY-7,8-DIHYDROBENZO[a]PYRENE. (Eng.) Beland, F. A. (Ben May Lab. Cancer Res., Univ. Chicago, Chicago, IL 60637); Harvey, R. G. *J Chem Soc Chem Commun* 1300(3): 84-85; 1976.

0113 SPECIFICALLY TRITIATED ARENE OXIDES. (Eng.) Yagi, H. (Natl. Inst. Arthritis, Metabolism, and Digestive Diseases, Natl. Inst. Health, Bethesda, MD 20014); Dansette, P.; Jerina, D. M. *J Labelled Comp Radiopharm* 12(1): 127 132; 1976.

0114 CHROMOSOME PATTERNS (G AND C BANDS) OF IN VITRO CHEMICAL CARCINOGEN-TRANSFORMED GUINEA PIG CELLS. (Eng.) Popescu, N. C. (Natl. Cancer Inst., Bethesda, MD 20014); Evans, C. H.; DiPaolo, J. A. *Cancer Res* 36(4): 1404-1413; 1976.

0115 THE SENSITIVITY OF THE SKIN OF HAIRLESS MICE TO CHEMICAL CARCINOGENESIS. (Eng.) Iversen, U. (Inst. Pathology, Univ. Oslo, Rikshospitalet, Oslo 1, Norway); Iversen, O. H. *Cancer Res* 36(4): 1238-1241; 1976.

0116 HYDROCARBON-NITROSAMINE SYNERGISM AS A POSSIBLE AMPLIFYING FACTOR IN LUNG TUMORIGENESIS BY TOBACCO SMOKE. (Eng.) Argus, M. F. (U. S. Public Health Service Hosp., 210 State St., New Orleans, LA 70118); Arcos, J. C. *J Theor Biol* 56(2): 491-498; 1976.

0117 FORMATION AND DETERMINATION OF NAPHTHALENES IN CIGARETTE SMOKE. (Eng.) Schmeltz, I. (Naylor Dana Inst. Disease Prevention, American Health Foundation, Valhalla, N.Y. 10595); Tosk, J.; Hoffmann, D. *Anal Chem* 48(4): 645-650; 1976.

0118 CHLOROMETHYL ETHERS, CIGARETTES, COUGH AND CANCER. (Eng.) Weiss, W. (Hahnemann Medical Coll. Hosp., Philadelphia, PA). *J Occup Med* 18(3): 194-199; 1976.

0119 ANGIOSARCOMA OF THE LIVER (Letter to Editor). (Eng.) Dalderup, L. M. (Factory Inspectorate (DGA), Voorburg, P.B. 69, Holland); Freni, S. C.; Bras, G.; Bronckhorst, F. B. *Lancet* 1(7953): 246; 1976.

0120 PROMOTING EFFECT OF SODIUM DEOXYCHOLATE ON COLON ADENOCARCINOMAS IN GERMFREE RATS. (Eng.) Reddy, B. S. (American Health Foundation, Valhalha, NY 10595); Narasawa, T.; Weisburger, J. H.; Wynder, E. L. *J Natl Cancer Inst* 56(2) 441-442; 1976.

0121 CYTOTOXICITY, MUTATIONS AND DNA DAMAGE PRODUCED IN CHINESE HAMSTER CELLS TREATE WITH STREPTOZOTOCIN, ITS ANALOGS, AND N-METHYL-N'-NITRO-N-NITROSOGUANIDINE. (Eng.) Bhuyan, B. K. (Cancer Res., Upjohn Co., Kalamazoo, MI 49001); Peterson, A. R.; Heidelberger, C. *Chem Biol Interact* 13(2): 173-179; 1976.

0122 AN ULTRASTRUCTURAL STUDY ON PRECANCEROUS AND CANCEROUS LESIONS OF THE GLANDULAR STOMACH IN RATS INDUCED BY N-METHYL-N'-NITRO-N NITROSOGUANIDINE. (Eng.) Tahara, E. (Hiroshima Sch. Medicine, Hiroshima, Japan); Haizuka, S.; Tokuoka, S. *Acta Pathol Jpn* 26(1): 1-15; 1976.

0123 LYMPHOCYTOPENIA IN PATIENTS TREATED WITH PHENYTOIN (Letter to Editor). (Eng.) Brandt, L. (Univ. Hosp., S-221 85 Lund, Sweden); Nilsson, P. G. *Lancet* 1(7954): 308; 1976.

0124 ACUTE MYELOBLASTIC LEUKAEMIA AFTER HYDA TOIN (Letter to Editor). (Eng.) Almici, C. (Ospedali Civili di Brescia, Italy); Inzoli, M R.; Lazzaroni, G. *Haematologica (Roma)* 59(4): 510 511; 1975.

0125 ORAL CONTRACEPTIVES AND MALIGNANT HEPATOMA (Letter to Editor). (Eng.) Glassberg, A. B. (San Francisco Hematology-Oncology Associates, San Francisco, CA 94115); Rosenbaum, E. H. *Lancet* 1(7957): 479; 1976.

26 ORAL CONTRACEPTIVES AND BENIGN LIVER TUMOUR (Letter to Editor). (Eng.) Bartok,
(Peterfy Hosp., 1441 Budapest, P. O. Box 76,
ngary); Garas, S.; Szabo, L. *Lancet* 1(7957):
9-480; 1976.

27 CONTRACEPTIVE CHOICE AND PREVALENCE OF CERVICAL DYSPLASIA AND CARCINOMA IN SITU.
ng.) Ory, H. (Public Health Service, U.S.
pt. Health, Education Welfare, Atlanta, GA
333); Naib, Z.; Conger, S. B.; Hatcher, R. A.;
ler, C. W., Jr. *Am J Obstet Gynecol* 124(6): 573-
7; 1976.

0128 SERUM PROLACTIN CONCENTRATIONS IN WOMEN TREATED WITH CHLORMADINONE ACETATE. (Eng.) Beck, P. (Box C-292, Univ. Colorado Sch. Medicine, 4200 E. Ninth Ave., Denver, CO 80220); Malarkey, W. B. *Am J Obstet Gynecol* 124(6): 578-581; 1976.

See also:

* (Rev): 0001, 0002, 0003, 0004, 0005, 0006, 0007, 0008, 0022, 0023, 0024, 0025
* (Phys): 0132, 0141
* (Viral): 0178, 0179, 0216, 0242
* (Immun): 0262, 0265, 0274, 0275
* (Path): 0389, 0457, 0469
* (Epid-Biom): 0489, 0491, 0497, 0503, 0504, 0505

0129 EFFECT OF ULTRASOUND ON EUCHROMATIN AND HETEROCHROMATIN FROM NORMAL AND VIRAL TRANSFORMED MAMMALIAN CELLS. (Eng.) De La Maza, L. M. (Univ. Minnesota Sch. Medicine, Minneapolis, MN 55455); Mosharrafa, E.; Yasmineh, W. G. *Exp Cell Res* 97(2): 448-451; 1976.

The susceptibility of chromatin from normal and viral transformed cells (UMMA-RSV-22, UMMA-RSV-4, BALB/c-3T3-B77, SV3T3-56, *Microtus agrestis* [liver], and *Mus musculus* [liver]) to breakage by ultrasound was studied in an in vitro system in which DNA repair was reduced to a minimum. The extent of damage to heterochromatin and euchromatin was assessed by estimating the molecular weight of the DNA fragments extracted from these fractions. In both normal and transformed cells, the euchromatin fraction was more susceptible to breakage; this was explained on the basis of the structural differences between the two kinds of chromatin.

0130 NONSECRETORY PLASMA CELL DYSCRASIA FOLLOWED BY ACUTE GRANULOCYTIC LEUKEMIA 25 YEARS AFTER THOROTRAST ADMINISTRATION. (Eng.) Bethlenfalvay, N. C. (Fitzsimons Army Medical Center, Denver, CO 80240); Henley, L. B.; Rupp, T. D.; Phyliky, R. L. *Cancer* 37(3): 1449-1453; 1976.

Twenty-three years after an injection of Thorotrast, profound depression of humoral and cellular immunity associated with extensive marrow plasmocytosis developed in a 75-yr-old man. Twelve months of chemotherapy with L-phenylalanine mustard resulted in hematologic remission. Radioautograph of his marrow showed signs of alpha-radiation; whole body counting revealed a significant thorium burden. One year after chemotherapy was stopped, and two years after initial presentation, aleukemic acute granulocytic leukemia led to his death. The possible role of thorium in the etiology of two successive hematopoietic neoplasms is discussed.

0131 ENVIRONMENTAL RADIOACTIVITY IN GREENLAND IN 1974. (Eng.) Aarkrog, A. (No Affiliation Given); Lippert, J. In: *Risoe Report, Danish Atomic Energy Commission. (Roskilde, Denmark)*: No. 325, 20 pp.; 1975.

Measurements of fall-out radioactivity in Greenland in 1974 were presented and compared with those of Denmark and the Faroe Islands; levels of Strontium-90 and, in most cases, Cesium-137 were determined. The ^{90}Sr fall-out rates in 1974 were the following: Godhavn, approximately 0.8 mCi ^{90}Sr/km^2; Godthab, 0.5 mCi ^{90}Sr/km^2; Prins Christians Sund, approximately 1.2 mCi ^{90}Sr/km^2; Upernavik, 0.4 mCi ^{90}Sr/km^2. The accumulated fall-out levels by the end of 1974 were estmated at approximately 27 mCi ^{90}Sr/km^2 at Godhavn, 39 mCi ^{90}Sr/km^2 at Godthab, 140 mCi ^{90}Sr/km^2 at Prins Christians Sund, and 16 mCi ^{90}Sr/km^2 at Upernavik. The food consumed in Greenland in 1974 contained, on the average, 4.8 pCi ^{90}Sr/g Ca, and the daily mean intake of ^{137}Cs was estimated at 54 pCi. The most important ^{90}Sr contributors to the diet were grain products and milk products, together accounting for approximately 65% of the total ^{90}Sr content of the diet. Cesium-137 came mainly from meat (reindeer and lamb) and fish, contributing 90% of the total ^{137}Cs content of the diet. No ^{90}Sr analyses of human bone samples were carried out on the population of Greenland. From whole body counts and diet measurements, the ^{137}Cs content in Greenlanders was estimated at 25-50 pCi ^{137}Cs/g K.

0132 SYNERGISM BETWEEN NEUTRON RADIATION AND DIETHYLSTILBESTROL IN THE PRODUCTION OF MAMMARY ADENOCARCINOMAS IN THE RAT. (Eng.) Shellabarger, C. J. (Brookhaven Natl. Lab., Upton, NY 11973); Stone, J. P.; Holtzman, S. *Cancer Res* 36(3): 1019-1022; 1976.

The effect of combined neutron radiation and diethylstilbestrol (DES) on female A x C rats was studied. When young rats were given 9.6 rads of 0.43-MeV neutrons, 32 of 33 survived a 50-wk follow-up period; two rats developed a total of three mammary adenocarcinomas, and three rats developed a total of four mammary fibroadenomas. For 25 rats implanted with a 20-mg pellet containing 5 mg DES and 15 mg cholesterol, average survival was 284 days; 22 rats developed a total of 182 mammary adenocarcinomas, and 21 rats developed a pituitary tumor. When DES was given two days before neutron radiation to 35 rats, the average survival was 239 days; 32 rats developed a total of 842 mammary adenocarcinomas, one rat developed a single mammar fibroadenoma, and 34 rats developed a pituitary tumor. All 31 control rats survived the 50-wk study period, and none developed tumors. Twenty-one rats that received both DES and neutron radiation and one rat that received only DES exhibited a multiple mammary adenocarcinoma response with a range of 18-72 mammary adenocarcinomas per rat. These results suggest that a synergistic interaction between DES and neutron radiation on mammary adenocarcinoma formation occurs in terms of an earlier onset and a larger number of mammary adeno carcinomas. These results confirm and complement a previously reported synergistic interaction betwee DES and x-radiation on mammary adenocarcinoma formation in A x C female rats.

0133 ENVIRONMENTAL RADIOACTIVITY IN THE FAROE IN 1974. (Eng.) Aarkrog, A. (No Affilia- tion Given); Lippert, J. In: *Risoe Report, Danish Atomic Energy Commission. (Roskilde, Denmark)*: No. 324, 24 pp.; 1975.

Measurements of the fall-out radioactivity in the Faroes in 1974 were compiled. Strontium-90 (and, i most cases, ^{137}Cs) was determined in regularly col lected samples of precipitation, grass, milk, fish sea water, bread, and drinking water; analyses we also made of spot samples of lamb, potatoes, sea plants, vegetables, eggs, and human bone. The ^{90}S fall-out rate in the Faroes in 1974 was about 1.3 mCi/km^2; the accumulated fall-out by the end of 1 was estimated at about 98 mCi ^{90}Sr/km^2. The mean level of ^{90}Sr in Faroese milk was 20 S. U. or 24

pCi ^{90}Sr/1. The ^{137}Cs concentration was 158 pCi
^{137}Cs/g K, or 254 pCi ^{137}Cs/1. Lamb contained 14
pCi ^{90}Sr/kg and 1.44 nCi ^{137}Cs/kg. Fish showed mean
levels of 0.6 pCi ^{90}Sr/kg and 11 pCi ^{137}Cs/kg. The
mean content of ^{90}Sr in drinking water was 0.31 pCi/
1. The mean daily per capita dietary intakes in 1974
were estimated at 17 pCi ^{90}Sr (10 S. U.) and 239 pCi
^{137}Cs (73 pCi ^{137}Cs/kg). The mean content of ^{137}Cs
in the Faroese adult was estimated at about 40-80 pCi
^{137}Cs/g K. This estimate was based on whole body
measurements of six adults in 1974.

0134 ENVIRONMENTAL RADIOACTIVITY IN DENMARK IN 1974.

(Eng.) Aarkrog, A. (No Affilia-
tion Given); Lippert, J. In: *Risoe Report, Danish
Atomic Energy Commission. (Roskilde, Denmark)*: No.
323, 117 pp.; 1975.

Fall-out radioactivity was measured in Denmark in
1974; Strontium-90 (^{90}Sr) and Cesium-137 (^{137}Cs)
levels were evaluated. The mean content of ^{90}Sr in
air was 0.0014 pCi ^{90}Sr/m^3; this was 3.6 times the
1973 level. By the end of 1974 the accumulated
fall-out down to a depth of 50 cm was about 56 mCi
^{90}Sr/km . The ^{137}Cs measurement was 94 mCi/km^2. Fall-
out levels in Jutland were 15-25% higher than levels
found in eastern Denmark; this was expected because
of the greater precipitation in Jutland. The median
level of ^{90}Sr in Danish ground water was 0.006 pCi
^{90}Sr/1. From analyses of the individual diet com-
onents, the ^{90}Sr level in the Danish average diet
was estimated to be 12.8 pCi and the ^{137}Cs intake to
e 15 pCi ^{137}Cs/day; this was nearly equal to the
973 levels. Dietary levels of ^{90}Sr and ^{137}Cs averaged
ignificantly higher in Jutland than in eastern Den-
ark. The mean content of ^{90}Sr in inner Danish surface
aters was about 0.83 pCi ^{90}Sr/1; this was higher
han in previous years and the level of ^{137}Cs was
lso higher. The Chinese thermonuclear atmospheric
ests on June 27, 1973 were blamed for the greater
tmospheric fall-out rate. The increase in ^{90}Sr and
^{37}Cs in inner Danish sea waters was blamed on pollu-
ion from reprocessing plants in the U.K. and France.

35 DIRECT EVIDENCE THAT PYRIMIDINE DIMERS IN DNA RESULT IN NEOPLASTIC TRANSFORMA-

ION. (Eng.) Hart, R. W.; Setlow, R. B. In:
*lecular Mechanisms for Repair of DNA. Basic Life
iences*, vol. 5B. Edited by Hanawalt, P. C.;
etlow, R. B. New York, Plenum Press, 1975, pp.
9-724.

otoreactivation (PR) was used as a specific test
r the biological role of UV-induced pyrimidine
mers in the DNA of fish, which have large amounts
the PR enzyme. Portions of cell suspensions of
ssue from various organs of Poecilia formosa
re exposed to UV radiation (254 nm), then in-
cted into isogenic recipients. An incident flu-
ce of 20 J/m^2 resulted in 10% of the fish with
rge granulomas and 100% with thyroid carcinomas.
the irradiated cell suspension was illuminated
th PR light before injection, the yields of both
types of lesion were reduced approximately 10-fold. If the PR light was given before the UV exposure, there was no reduction in the numbers of growths. These experiments show that pyrimidine dimers in DNA can lead to neoplastic transformation.

0136 THE USE OF HUMAN ADENOVIRUS 2 IN THE STUDY OF THE XERODERMA DNA-REPAIR DEFECT.

(Eng.) Day, R., III. In: *Molecular Mechanisms for Repair of DNA. Basic Life Sciences*, vol. 5B. Edited by Hanawalt, P. C.; Setlow, R. B. New York, Plenum Press, 1975, pp. 747-752.

An extremely discriminating plaque assay was used for the study of the xeroderma DNA repair defect. UV-irradiated adenovirus 2 assayed by counting plaques on monolayers of human fibroblast strains was up to 30-fold more sensitive than normal if the strains used as viral hosts were prepared from persons having xeroderma pigmentosum. With this assay, every xeroderma fibroblast strain tested was found to exhibit a DNA repair defect, including those previously judged by other methods to have normal DNA repair. The technique has the advantage that the end point of the assay is based upon the restoration of total biological function to the damaged entity, not upon some arbitrary midpoint (unscheduled DNA synthesis, repair replication) generally associated with repair.

0137 TEMPERATURE-SENSITIVE DNA REPAIR OF ULTRAVIOLET DAMAGE IN HUMAN CELL LINES.

(Eng.) Goss, P. (Queensland Inst., Medical Res., Herston Road, Herston, Queensland, Australia); Parsons, P. G. *Int J Cancer* 17(3): 296-303; 1976.

Following exposure to UV irradiation (60 erg x mm^{-2}), two of three human fibroblast strains (DJM and JHP, HFL being the exception) and one of three melanoma cell lines showed lower rates of thymine dimer excision during 24 hr at 40 C than at 36 C. All lines (WI-38, JHP, DJM, MM96, MM127, MM138, MM200, MM229) had lower rates at 32 C. Autoradiographic studies of three fibroblast strains and four melanoma lines incubated for four hours after irradiation revealed decreased unscheduled DNA synthesis at 42 C compared with 36 C. The rate of semiconservative DNA synthesis was decreased at the upper temperature in both series of experiments. All eight cell lines tested showed decreased repair at 42 C, as judged by slower sedimentation and increased heterogeneity of parental DNA in alkaline sucrose gradients. Experiments using the DNA synthesis inhibitor actinomycin D suggested that these effects were due to temperature-sensitive repair synthesis. In the two lines studied, preincubation of cells at 42 C apparently increased the extent of UV damage. These results are consistent with the possibility that temperature-sensitive DNA repair is a contributory factor in some cases of solar carcinogenesis.

0138 DNA SINGLE-STRAND BREAKS DURING REPAIR OF UV DAMAGE IN HUMAN FIBROBLASTS AND ABNORMALITIES OF REPAIR IN XERODERMA PIGMENTOSUM. (Eng.) Fornace, A. J., Jr. (Peter Bent Brigham Hosp., Boston, MA 02115); Kohn, K. W.; Kann, H. E., Jr. *Proc Natl Acad Sci USA* 73(1): 39-43; 1976.

DNA alkaline elution was used to study the formation and resealing of DNA single-strand breaks after irradiation of human fibroblasts with ultraviolet light (UV). The results were generally consistent with current concepts of DNA excision repair, in that breaks appeared rapidly after UV, and resealed slowly in normal fibroblasts, whereas breaks did not appear in those cells of patients with xeroderma pigmentosum (XP) that are known to have defects in DNA repair synthesis. The appearance of breaks required a short post-UV incubation, consistent with the expected action of an endonuclease. Cells of the variant form of XP characterized by normal DNA repair synthesis exhibited normal production of breaks after UV, but were slower than normal cells in resealing those breaks. This difference was enhanced by caffeine. DNA crosslinking appears to cause an underestimate in the measurement of DNA breakage after UV.

0139 REPAIR OF DNA STRAND BREAKS IN PROGERIC FIBROBLASTS AND AGING HUMAN DIPLOID CELLS. (Eng.) Little, J. B.; Epstein, J.; Williams, J. R. In: *Molecular Mechanisms for Repair of DNA. Basic Life Sciences*, vol. 5B. Edited by Hanawalt, P. C.; Setlow, R. B. New York, Plenum Press, 1975, pp. 793-800.

The rate of rejoining of DNA strand breaks induced by 10 krad of gamma-irradiation was studied in normal human diploid skin fibroblasts and in skin fibroblasts from six patients with symptoms of progeria. Although slightly more rapid in very early passage, the repair rate in normal cells was similar throughout most of their life span in vitro. The appearance of cells with reduced repair capacity was evident as the cultures became senescent. The progeric fibroblasts varied greatly in their response to irradiation. The rate of repair was greatly reduced in two strains, whereas in two others extensive DNA degradation was consistently observed in unirradiated cells. Degradation was apparently related to the radiation received from the incorporated radiolabel. Normal repair was seen in progeric fibroblasts transformed by simian virus 40. The results suggest that the control of the genetic expression of a repair system, rather than a specific gene defect, may be involved.

0140 SCANNING ELECTRON MICROSCOPY OF SURFACE FEATURES OF HAMSTER EMBRYO CELLS TRANSFORMED IN VITRO BY X-IRRADIATION. (Eng.) Borek, C. (Coll. Physicians and Surgeons, Columbia Univ., New York, NY 10032); Fenoglio, C. M. *Cancer Res* 36(4): 1325-1334; 1976.

Scanning electron microscope studies were carried out on Syrian hamster embryo cells transformed in vitro by x-irradiation (300 rads) (x-ray transformed) and on nonirradiated and irradiated nontransformed controls. Transformed cells appeared as pleomorphic, thick cells piling up over each other and exhibiting extensive surface features consisting of microvilli, blebs, and ruffles. These surface structures were seen on single and on densely cultured transformed cells during both interphase and mitosis. The complex surface was observed shortly after transformation (on cells of a 20-day-old clone) and after 8 yr in culture. All controls appeared as regular, flat, and smooth cells which grew in high-density cultures to seemingly contact-inhibited monolayers. During mitosis, nontransformed cells displayed surface excrescences similar to those of the transformed cells. The complex surface features in the normal cells were temporary, and reversed to characteristic smoothness upon reentrance into interphase.

0141 CYTOTOXIC AND MUTAGENIC EFFECTS OF CARCINOGENIC AROMATIC AMIDES AND POLYCYCLIC HYDROCARBONS AND ULTRAVIOLET IRRADIATION IN NORMALLY REPAIRING AND REPAIR-DEFICIENT (XERODERMA PIGMENTOSUM) DIPLOID HUMAN SKIN FIBROBLASTS. (Eng.) Maher, V. M.; McCormick, J. J. In: *Molecular Mechanisms for Repair of DNA. Basic Life Sciences*, vol. 5B. Edited by Hanawalt, P. C.; Setlow, R. B. New York, Plenum Press, 1975, pp. 785-787.

The cloning ability of fibroblasts taken from a xeroderma pigmentosum (XP) patient proved 2.5 to 3.5 times more sensitive to the cytotoxic effect of active derivatives of carcinogens or to UV irradiation than that of normal cells. They also exhibited a corresponding 2.5- to 3.5-fold greater increase in the frequency of induced mutations to 8-azaguanine resistance per survivor, which might have been expected since these XP cells exhibited less than 20% of the DNA repairing capacity of the normal cells following exposure to such DNA damaging agents.

0142 ^{90}Sr-^{90}Y DOSE DISTRIBUTION IN BEAGLES: INJECTION RELATIVE TO INGESTION. (Eng.) Momeni, M. H. (Center for Human Radiobiology, Argonne Natl. Lab., Argonne, IL 60439); Jow, N.; Bradley, E. *Health Phys.* 30(1): 3-19; 1976.

0143 LOCAL DOSIMETRY AND QUALITATIVE CHANGES IN ^{226}Ra- AND ^{90}Sr-^{90}Y-LABELED BEAGLE HUMERI. (Eng.) Momeni, M. H. (Sch. Veterinary Medicine, Univ. California, Davis, CA 95616); Williams, R. J. R.; Fisher, G. L.; Rosenblatt, L. S. *Health Phys* 30(1): 21-34; 1976.

0144 EFFECTS OF MICROWAVES ON THE METABOLIC TIME CLOCKS OF NORMAL AND TUMOUR CELLS: A LASER-RAMAN STUDY. (Eng.) Webb, S. J. (Dept. Physics, Univ. South Florida, Tampa, FL 33620); Montgomery, J.; Stoneham, M. E. *IRCS Med Sci: Cancer* 4(1): 10; 1976.

0145 IDENTIFICATION OF BACTERIAL, NORMAL AND TUMOUR MAMMALIAN CELLS BY LASER-RAMAN SPECTROSCOPY. (Eng.) Webb, S. J. (Dept. Physics, Univ. South Florida, Tampa, FL 33620); Stoneham, M. E.; Montgomery, J. *IRCS Med Sci: Cancer* 4(1): 8-9; 1976.

0146 RADIATION-INDUCED ANEUSOMIC CLONES IN BONE MARROW OF RATS. (Eng.) Kohno, S.-I. (Dept. Biology, Toho Univ., Miyama-cho, Funabashi, Chiba, 274, Japan); Ishihara, T. *Mutat Res* 35(1): 121-128; 1976.

0147 X-RADIATION-INDUCED TRANSFORMATION IN A C3H MOUSE EMBRYO-DERIVED CELL LINE. (Eng.) Terzaghi, M. (Harvard Univ. Sch. Public Health, Boston, MA 02115); Little, J. B. *Cancer Res* 36(4): 1367-1374; 1976.

See also:

* (Rev): 0009, 0010
* (Chem): 0065, 0122
* (Immun): 0276
* (Path): 0449, 0461

0148 ON THE FIDELITY OF DNA REPLICATION: LACK OF EXODEOXYRIBONUCLEASE ACTIVITY AND ERROR-CORRECTING FUNCTION IN AVIAN MYELOBLASTOSIS VIRUS DNA POLYMERASE.

(Eng.) Battula, N. (McArdle Inst. Cancer Res., Univ. Wisconsin, Madison, WI 53706); Loeb, L. A. *J Biol Chem* 251(4): 982-986; 1976.

Evidence for the ability of avian myeloblastosis virus DNA polymerase to utilize mismatched primer termini for chain elongation is presented. Homogeneous DNA polymerase (''reverse transcriptase'') from avian myeloblastosis virus was assayed for exodeoxyribonuclease activity. The substrates were defined template initiator complexes in which different radioactive nucleotides were present at the 3'-OH termini of the initiator. Even when the number of molecules of enzyme was equal to the number of initiator termini, there was no significant release of radioactivity with any of the template-initiator combinations tested. Under similar conditions, the nuclease activity associated with either Escherichia coli or Ta_4 DNA polymerases rendered more than 90% of the initiator termini acid-soluble. The ratio of exodeoxyribonuclease activity to protein with avian myeloblastosis DNA polymerase is less than 0.003% of that obtained with E. coli DNA polymerase I. Furthermore, avian myeloblastosis virus DNA polymerase failed to excise mispaired terminal nucleotides in both the presence and absence of polymerization. The authors conclude that avian myeloblastosis virus DNA polymerase utilizes mispaired initiator termini when complexed to ribohomopolymer and deoxyribohomopolymer templates as functional sites for chain propagation. The efficiency of utilization of the paired and mispaired termini is about equal in that the amount of synthesis, and the size of the products formed are similar. The ability of the enzyme to utilize the mismatched termini as starting points for polymerization has been unambiguously demonstrated by transfer of ^{32}P from the newly synthesized product to the mispaired 3'-terminal nucleotide on the initiator.

0149 ON THE FIDELITY OF DNA REPLICATION: ENZYME ACTIVITIES ASSOCIATED WITH DNA POLYMERASES FROM RNA TUMOR VIRUSES.

(Eng.) Seal, G. (Fox Chase Cancer Center, Philadelphia, PA 19111); Loeb, L. A. *J Biol Chem* 251(4): 975-981; 1976.

DNA polymerase from RNA tumor viruses (''reverse transcriptase'') was analyzed for activities which have been associated with other DNA polymerases. Homogeneous DNA polymerase from avian myeloblastosis virus catalyzed pyrophosphate exchange and pyrophosphorolysis. Pyrophosphate exchange was dependent on a template and was base-specific. With avian myeloblastosis virus DNA polymerase, ribonucleotide templates were more efficient for synthesis while deoxyribonucleotide templates were more effective for pyrophosphate exchange. Synthesis, pyrophosphate exchange, and pyrophosphorolysis were inhibited by the chelating agent 1, 10-phenanthroline, suggesting that enzyme-bound zinc is required for each of these reactions. The pyrophosphate exchange reaction was also demonstrated with the DNA polymerase from a mutant of Rous sarcoma virus that possesses a temperature-sensitive DNA polymerase. The pyrophosphate exchange reaction with the mutant polymerase was temperature-sensitive, demonstrating that pyrophosphate exchange is catalyzed by the viral DNA polymerase and that the same mutation effects both DNA polymerase and pyrophosphatase activity. The results demonstrate that unlike *Escherichia coli* DNA polymerase I, the DNA polymerase from avian myeloblastosis virus fails to degrade polydeoxyribonucleotides or to convert deoxynucleoside triphosphates into monophosphates. The authors suggest that this lack of hydrolytic activities in avian myeloblastosis DNA polymerase should facilitate kinetic studies on the mechanism of DNA synthesis by this enzyme.

0150 THE EXPRESSION AND LOCALIZATION OF SURFACE NEOANTIGENS IN TRANSFORMED AND UNTRANSFORMED CULTURED CELLS INFECTED WITH AVIAN TUMOR VIRUSES.

(Eng.) Philips, E. R. (Jewish General Hosp., Montreal, Quebec, Canada 113T 1E2); Perdue, J. F. *J Supramol Struct* 4(1): 27(27)-44 (44); 1976.

The presence and localization of neoantigens induced in cultured cells, infected or transformed with avian tumor viruses (ATV), were studied ultrastructurally on carbon platinum replicas of cell surfaces. The use of antibody, labeled with hemocyanin molecules, provided sensitive detection and analysis of cell surface antigen distribution. The subgroup-specific antigens of the viral envelope were found in considerable amount in the plasma membranes of ATV-infected chick embryo fibroblasts. The distribution of these antigens over the cell surface, evaluated on cells prefixed with glutaraldehyde, was found to be diffuse with a greater density on the cell processes in some cells. Reaction of antibody to viral envelope antigens with living ATV-infected cells resulted in a number of patterns of redistribution of membrane antigen-antibody complexes (AAC). Redistribution occurred in symmetrical or asymmetrical modes. The former consisted of randomly oriented aggregates (patches of AAC over the cell surface. The latter included: (a) linear accumulation of AAC at cell margins; and (b) condensation of complexes into one or more centers of coalescence. These observations could be made on chick embryo cells infected (but not transformed) by avian leukosis virus, or on cells oncogenically transformed by avian sarcoma virus. The regions of coalescence were suggestive of the ''capping'' phenomenon seen in other systems, and their formation was temporally correlated with endocytosis of labeled AAC and the gradual loss o AAC from the surface. Sodium azide (30 mM), puromycin (20 μg/ml), actinomycin D (2 μg/ml), and colchicine (1 μM) had no effect on either form of asymmetrical redistribution in ALV-infected fibroblasts. Cytochalasin B (CB, 12.5 microg/ml) and iodoacetic acid (IAA, 1 mM) appeared to have some effect on the marginal redistribution, and t completely prevent the condensation into foci of coalescence (FC). When treated with these compounds, reacted with antibody at low temperature, washed free of unbound antibody, and warmed at 37 C, cells rapidly cleared their surfaces of AAC. This was not accompanied by formation of FC or endocytosis. In some cells, a distribution suggesting a possible centrifugal flow of antigenic sites was observed. None of the drugs tested affected symmetrical redistribution. Repeated attempts at detection and topographical analysis of a tumor-specific antigen on the surface of Rous sarcoma virus-transformed chicken and rat cells provided no evidence for antibody to such an antigen in the serum of immunized animals. Autochthonous, homologous, and heterologous immunizations of chickens and rats did not produce a detectable antibody response to a virus-specific tumor surface antigen. Preliminary results, however, suggest the expression of an individual-specific (unique) tumor antigen on the surface of Rous sarcoma-transformed cells.

0151 MOLECULAR ANALYSIS OF THE ONCOGENE.

(Eng.) Weiss, R. (no affiliation given). *Nature* 260(5547): 93; 1976.

Genetic evidence that avian sarcoma viruses carry a specific gene (''sarc'') for neoplastic transformation of the host cell has accrued over the past 5 yr. A specific complementary DNAsarc probe complementary to the sarc gene of the virus has been prepared. Hybridization of complementary DNAsarc to DNA of other avian species reveals a widespread occurrence of sarc-like sequences in normal DNA, including that of a primitive ratite bird, the emu. Other investigators have detected sarcoma-specific sequences in different strains of murine sarcoma virus. There is so far no genetic evidence of specific oncogenes in leukemia viruses of any kind. If viral sarc sequences code for a pecific protein, it may be possible to identify t by comparing in vitro translation products of arcoma viruses with those of their transformation-efective deletion mutants.

0152 MIXED-CULTURE CYTOPATHOGENICITY BETWEEN KC AND XC ONCORNAVIRUS INDICATOR LINES ND ''VIRUS-FREE'' HUMAN CHORIOCARCINOMA CELLS.

Eng.) Rand, K. H. (Stanford Univ. Medical Center, tanford, CA 94035); Reed, B.; Broseus, I.; Hampar, .; Gilden, R.; Long, C. *J Natl Cancer Inst* 56(3): 09-512; 1976.

hen rat (XC) cells, transformed by Rous sarcoma irus, and human (KC) cells were cocultivated with ppropriate infected cells, cell fusion was extenive and rapid. Many human cell lines were creened, with negative results; however, several ormone-secreting human choriocarcinoma cells used extensively with both KC and XC cells. No vidence of a virus involvement in this interacion was found by direct examination, transmission, r immunologic tests. The mechanism apparently equires cell to cell contact, does not depend on rotein synthesis, is possibly unrelated to hormone synthesis in these cells, and results in the usion of both cell types in the syncytia, rather than the induction of fusion in one cell type by the other.

0153 ISOLATION OF NUCLEIC ACID-BINDING PROTEIN: STIMULATION OF REVERSE TRANSCRIPTASE-CATALYSED DNA SYNTHESIS.

(Eng.) Hung, P. P. (Abbott Lab., North Chicago, IL 60064); Lee, S. G. *Nature* 259(5543): 499-502; 1976.

The isolation of a nucleic acid-binding (unwinding) protein from chick fibroblasts transformed by Rous sarcoma virus is described, and its effect on DNA synthesis is reported. Binding protein was isolated by affinity chromatography after two weeks of virus infection. Using either ^{3}H-poly d(AT) x poly d(AT) or ^{3}H-poly(rA) x poly(dT) as templates, three peaks of binding activity were observed. The effect of the isolated binding protein on polymerase activity was studied in a reaction in which reverse transcriptase catalyzed DNA synthesis using heat-denatured calf thymus DNA as template. The protein was bound to DNA and stimulated reverse transcriptase in DNA synthesis. When heat-denatured DNA was used as template, denatured DNA in the absence of the protein was a poor template. Binding protein, however, stimulated DNA synthesis by 14-fold when the same template was used. It is thus suggested that the protein binds strongly and cooperatively to single-stranded DNA and thus promotes unwinding of the small region of undenatured, double-stranded segment to which reverse transcriptase is attached.

0154 CONTROL OF THE UPTAKE OF AMINO ACIDS BY SERUM IN CHICK EMBRYO CELLS, UNTRANSFORMED OR TRANSFORMED WITH ROUS SARCOMA VIRUS.

(Eng.) Bhargava, P. M. (Regional Res. Lab., Hyderabad 500009, India); Vigier, P. *J Membr Biol* 26(1): 19-30; 1976.

Forty to fifty minutes after removal of serum, the net total uptake of amino acids in growing secondary cultures of normal or virus-transformed chick embryo cells stopped or proceeded at only a highly reduced rate. In both normal and transformed cells, the initial (0-40 min) rate of the above uptake was the same in the absence of serum as in its presence. The initial rate of the total uptake of amino acids in growing transformed cells was about the same as in growing normal cells. Neither in the normal nor in the transformed cells was the rate of the total uptake of amino acids reduced by cell confluence alone. In highly dense, hyperconfluent cultures of normal cells in which cell growth was arrested, the rate of uptake in the absence or in the presence of serum was four- to fivefold lower than the rate obtained in growing normal cells under similar conditions; in the absence of serum, the net uptake stopped after 40 min in the hyperconfluent cultures as well. It appeared that cells growing in tissue culture require a serum factor for maintenance of the required high rates of uptake of amino acids and that the inhibition of growth at high cell densities is a result of depletion of this factor from serum, or the inability of the cells in a dense culture to respond to the factor. A serum factor also seemed necessary for maintenance of the reduced rates of uptake of amino acids observed in hyperconfluent cultures.

0155 TRANSFORMATION-ENHANCING FACTOR(S) PRODUCED BY VIRUS-TRANSFORMED AND ESTABLISHED CELLS. (Eng.) Kryceve, C. (Institut du Radium [Biologie], Faculte des Sciences, 91405 Orsay, France); Vigier, P.; Barlati, S. *Int J Cancer* 17(3): 370-379; 1976.

Chick embryo fibroblasts (CEF) and hamster BHK21 cells transformed by the Schmidt-Ruppin strain of Rous sarcoma virus (SR-RSV) release into the culture medium a factor or factors which enhance two- to seven-fold the formation of transformed foci by chick embryo fibroblasts infected with the Bryan strain of RSV (B-RSV). The factor(s) also increase the number of foci failing to revert to normal phenotype at restrictive temperature (41 C) in cultures infected with a temperature-sensitive mutant (FU-19) of SR-RSV which is defective for transformation. The factor(s) is also produced by BHK21 cells transformed by other tumor viruses and by BHK21 cells passaged for a long time, but not by normal CEF, CEF transformed by B-RSV, CEF infected by FU-19 at 41 C, normal hamster embryo fibroblasts, established but density-inhibited mouse fibroblasts, or BHK21 cells of early passages. The relative enhancement of the number of B-RSV foci can be more than 100-fold when the medium contains fetal calf serum, which suppresses focus formation in controls. The focus-enhancing factor(s) appears to act after infection and has been termed, operationally, transformation-enhancing factor(s) (TEF). The factor produced by RS2/3 cells which enhances the formation of B-RSV foci is non-dialyzable and thermolabile, and is presumably a protein. Its molecular weight is between 10^5 and 2×10^5 daltons.

0156 IODINATION OF ZETA PROTEIN BY LACTOPEROXIDASE, CHLOROPEROXIDASE AND CHLORAMINE T. (Eng.) Jone, C. (Dept. Biochemistry, Univ. Illinois, Urbana, IL 61801); Hager, L. P. *Biochem Biophys Res Commun* 68(1): 16-20; 1976.

Normal and Rous sarcoma virus-transformed chicken embryo fibroblasts cultured on petri dishes were labeled with ^{125}I by two enzymic methods and one chemical method. The enzymic labeling systems employed chloroperoxidase and lactoperoxidase. Hydrogen peroxide was generated by glucose oxidase and glucose. The chemical method used chloramine T as the oxidant for iodide ion. After solubilization of cells, sodium dodecyl sulfate disc gel electrophoresis and gamma counting, it was found that only one cell protein was predominantly labeled in all three reactions. This protein, a major cell surface protein, has been previously identified and termed Zeta protein. Zeta protein disappears from transformed cells and is susceptible to trypsin digestion.

0157 INDUCTION OF SYNCYTIA BY THE BOVINE C-TYPE LEUKEMIA VIRUS. (Eng.) Diglio, C. A. (Sch. Veterinary Medicine, Univ. Pennsylvania, New Bolton Center, Kennett Square, PA 19348); Ferrer, J. F. *Cancer Res* 36(3): 1056-1067; 1976.

Syncytia formation by bovine leukemia virus (BLV) in a number of cell cultures was studied. Bovine buffy coat cells infected with the virus induced syncytia formation in human diploid embryonic lung cells as well as in monolayer cell cultures of bovine, simian, ovine, bat, and caprine origin, but not in mouse fibroblast cells, normal rat kidney cells, or Rous sarcoma virus-transformed rat cells. Syncytia were not observed in diploid embryonic lung cells inoculated with bovine buffy coat cells free of BLV. The syncytia-induction effect was associated with the synthesis of complete BLV by the buffy coat cells and was independent of whether these cells were viable, disrupted, normal, or malignant. Cell-free preparations of BLV and density gradient-purified virus also induced syncytia when added directly to diploid embryonic lung cells and to bovine, bat, and caprine monolayer cell cultures. Ether treatment, UV light irradiation, heating, freezing, and thawing destroyed the syncytia-inducing activity of BLV. This activity was also neutralized when the virus was incubated with sera containing antibodies to BLV, but not when incubated with sera free of these antibodies or reference serum for the foamy-like bovine syncytial virus. BLV antigen was consistently detected by the immunofluorescent test in the syncytia-positive monolayer indicator cultures. However, syncytia formation was not necessarily associated with BLV production by the indicator cells. The ability to induce syncytia in monolayer cultures of nontransformed cells distinguishes BLV from all the known C-type leukemia viruses.

0158 DEVELOPMENT OF AN IN VITRO INFECTIVITY ASSAY FOR THE C-TYPE BOVINE LEUKEMIA VIRUS. (Eng.) Ferrer, J. F. (Sch. Veterinary Medicine, Univ. Pennsylvania, New Bolton Center, Kennett Square, PA 19348); Diglio, C. A. *Cancer Res* 36(3): 1068-1073; 1976.

The ability of the bovine C-type leukemia virus to induce syncytia formation in monolayer cell cultures was used to develop a specific and simple infectivity assay for the virus. Using bovine embryonic spleen cells or human diploid embryonic lung cells as indicator cells, the results of the assay can be evaluated in 4-6 or 6-8 days, respectively. Pretreatment of the indicator cells with DEAE-dextran greatly increases the sensitivity of the assay. The assay is quantitative and can be applied as a direct method for the identification of bovine C-type leukemia virus-infected animals;

it also provides a simple and sensitive procedure for the detection and titration of virus-neutralizing antibodies.

0159 BRIEF COMMUNICATION: LACK OF INFECTIVITY OF BOVINE LEUKEMIA (C-TYPE) VIRUS TO RATS.

(Eng.) Barthold, S. W. (Yale Univ. Sch. Mediçine, New Haven, CT 06510); Baumgartener, L. E.; Olson, C. *J Natl Cancer Inst* 56(3): 643-644; 1976.

Sprague-Dawley rats were given ip injections of bovine culture and sheep cultures of bovine leukemia virus (BLV) and Gross passage-A leukemia virus [MuLV(G)]. Sera were tested for precipitin antibodies to BLM antigens, but none had antibodies to BLV antigens. BLV did not induce tumors in the rats, but they were susceptible to MuLV(G) at low doses.

0160 ISOLATION AND CHARACTERIZATION OF AN ANTIGEN OF THE BOVINE C-TYPE VIRUS.

(Eng.) McDonald, H. C. (Sch. Veterinary Medicine, Univ. Pennsylvania, New Bolton Center, Kennett Square, PA 19348); Graves, D. C.; Ferrer, J. F. *Cancer Res* 36(4): 1251-1257; 1976.

An antigen of the bovine C-type leukemia virus was isolated in a highly purified form by gel filtration and isoelectric focusing, from extracts of infected buffy coat cells. The antigen had a molecular weight of approximately 25,000 daltons and an isoelectric point of 6.4 to 6.6. In immunodiffusion experiments, it formed a line of identity with an antigen extracted from highly purified bovine C-type leukemia virus by treatment with ether or Triton X-100. As determined by immunodiffusion analyses, the bovine C-type leukemia virus ntigen did not have antigenic determinants in ommon with the murine or feline leukemia viruses, he foamy-like bovine syncytia virus, or the Mason fizer monkey virus.

161 TRANSMISSION OF BOVINE LEUKEMIA.

(Eng.) Martin, W. W. (no affiliation given). *gri Res* 24(9): 15; 1976.

ndirect experimental evidence suggesting that ovine leukemia may be transmissible in man was btained when eight adult chimpanzees all developed pecific antibodies 6-15 wk after inoculation with he virus. However, the virus could not be reovered from the inoculated chimpanzees. In a oncurrent study, no antibodies to bovine leukemia irus were detected in almost 1,300 human blood amples from leukemia patients, families with high ncidence of cancer, and patients with other kinds f tumors or with other diseases.

162 CHARACTERISTICS OF THREE STRAINS OF FELINE FIBROSARCOMA VIRUS GROWN IN CAT ND MARMOSET MONKEY CELLS.

(Eng.) McDonald, R. ush-Presbyterian-St. Luke's Medical Center, 1753 est Congress Parkway, Chicago, IL 60612); Thakkar, B.; Wolfe, L. G.; Deinhardt, F. *Int J Cancer* 17(3): 396-406; 1976.

Two strains of feline fibrosarcoma virus (ST-FeSV and GA-FeSV) were found to induce tumors in cats and marmosets, and to transform feline and marmoset cells in vitro after primary inoculation. A third strain (SM-FeSV) failed to induce tumors or transform marmoset cells after primary inoculation; however, when SM-FeSV-infected marmoset cultures were passed 26 times in vitro, the cell cultures released infectious virus which transformed marmoset fibroblasts but still failed to induce tumors in marmosets. ST-FeSV induced mainly round-cell type transformation (r foci), GA-FeSV induced predominantly mixed round-fusiform cell type transformation (fr foci), and SM-FeSV induced r and fr type foci with a higher proportion of fusiform cells in the fr foci than seen with GA-FeSV. Transforming virus was obtained from r or mixed r/fr foci of ST-FeSV but not from fr foci; heat treatment changed the virus from producing almost exclusively r type foci to inducing an increased number of fr foci. Passage of FeSV in cat cells yielded viruses with a higher ratio of infectivity for feline versus marmoset cells, while passage of FeSV in marmoset cells yielded virus with a relatively higher infectivity ratio for marmoset cells; the three strains differed in the degree of change in the infectivity ratio. Despite the alteration of host range of SV-FeSV propagated in marmoset fibroblasts, the virus retained feline P-30 antigen by CF and FA assays. Neutralization tests neither indicated nor excluded an alteration of the surface antigens of ST-FeSV or SM-FeSV propagated in marmoset fibroblasts. The alteration of the relative infectivity of FeSV during passage in marmoset cells may be due to: (1) the selection of a variant present in the original heterogeneous uncloned population; (2) mutation; or (3) recombination with some marmoset genetic material, possibly an unidentified endogenous marmoset virus.

0163 FELV-RELATED SEQUENCES IN DNA FROM A FELV-FREE CAT COLONY.

(Eng.) Okabe, H. (Flow Lab., Inc., 1710 Chapman Ave., Rockville, MD 20852); Twiddy, E.; Gilden, R. V.; Hatanaka, M.; Hoover, E. A.; Olsen, R. G. *Virology* 69(2): 798-801; 1976.

Livers of two cats (a 2-mo-old male and a 27-mo-old female) from a specific pathogen-free (SPF) colony with no evidence of feline type-C viruses (FeLV) or FeLV-related diseases were analyzed along with conventional cat tissues for the presence of DNA sequences and virus-specific RNA expression utilizing complementary DNA (cDNA) prepared from the Gardner-Arnstein strain of feline sarcoma virus (GA-FeSV). cDNA was prepared in the endogenous RNA-dependent DNA-polymerase reaction and was purified by cosedimentation with viral 70S RNA. Hybridization of viral cDNA with cellular DNA indicated that livers from both SPF cats contained DNA sequences homologous to GA-FeSV. Similar final reaction extents and rates of reaction were obtained with these tissues and those prepared from cats with uncertain pathologic histories. cDNA annealed more rapidly and to a greater extent to DNA from GA-FeSV-producing cell lines than to DNA of apparently normal tissue. FeLV sequences were not found in all Felidae; e.g., ocelot and lion DNA's were negative for FeLV-related sequences. The authors conclude that the results of thermal elution profile of hybrid molecules between GA-FeSV cDNA and various cat cell DNA demonstrate that all cat cells contain FeLV-related DNA sequences to the same extent.

0164 CONSTRUCTION OF INFECTIOUS POLYOMA HYBRID GENOMES IN VITRO.

(Eng.) Miller, L. K. (Imperial Cancer Res. Fund, PO Box 123, Lincoln's Inn Fields, London WC2A 3PX, UK); Fried, M. *Nature* 259(5544): 598-601; 1976.

Hybrids of two strains of polyoma, A-3 and P16, were developed, and some DNA regions coding for phenotypic differences in the parent strains were located. Both A-3 and P16 were cleaved twice by the HindIII restriction endonuclease yielding two fragments of approximately 44% and 56% (designated HindIII-44% and HindIII-56%, respectively) of the genomes. The HindIII-44% of A-3 was combined with the HindIII-56% of the P16, and vice versa. The hybrid DNAs were covalently closed by T_4 DNA ligase. Using the DEAE-dextran technique, secondary whole mouse embryo cells were infected with the hybrid products. The HindIII-44% and HindIII-56% fragments alone had negligible contaminating infectivity [$< 1 \times 10^2$ plaque forming units (PFU)/microg DNA], while the combined fragments without ligation had a specific infectivity of 3×10^3 PFU/microg DNA; the ligased fragments had an infectivity of 1×10^5 PFU/microg DNA. The small plaque morphology of P16 was observed for the P16 HindIII-44%/A-3 HindIII-56%, and the large plaque morphology of the A-3 was observed for the A-3 Hind-III-44% P16 HindIII-56%, thus demonstrating that this phenotypic trait depends on the source of the HindIII-44% fragment.

0165 NEW STRUCTURAL CHARACTERISTICS OF THE LARGE GLYCOPEPTIDES FROM TRANSFORMED CELLS.

(Eng.) Ogata, S.-I. (Kobe Univ. Sch. Medicine, Ikuta-ku, Kobe, Japan); Muramatsu, T.; Kobata, A. *Nature* 259(5544): 580-582; 1976.

The idea that the presence of extra sialic acid is responsible for the higher molecular weight nature of the glycopeptides from transformed cells was investigated. Fucose-labeled large glycopeptides were prepared from the trypsinates of polyoma-transformed baby hamster kidney cells, and the small glycopeptides were prepared from the trypsinates of the normal and the polyoma-transformed cells. The results obtained from both paper electrophoresis and neuraminidase treatment confirmed that the large glycopeptides had more sialic acids than the small glycopeptides. About 70% of the small glycopeptides from both normal and polyoma-transformed cells were bound to a concanavalin A (Con A)-Sepharose column. Most of the bound glycopeptides were eluted by 0.1 M methyl α-mannoside. Only 20% of the large glycopeptides from polyoma-transformed cells were bound to the column; this did not change, even after neuraminidase digestion, indicating that the enrichment of sialic acid was not responsible. A new structural difference between large and small glycopeptides were therefore shown. Seventy percent of the cores from both the large glycopeptides of transformed cells and from the small glycopeptides of normal and transformed cells were bound to the Con A-Sepharose column. The molecular weights of all cores were about 1,100. Most of the large and small glycopeptides were hydrolyzed by endo-beta-N-acetylglucosaminidase D in the presence of neuraminidase, beta-galactosidase, and beta-N-acetylglucosaminidase, yielding glycopeptide fragments of molecular weight 450. The results suggest that the differences in molecular weight of glycopeptides from normal and transformed cells may involve not only sialic acid, but also galactose and N-acetylglucosamine.

0166 VASCULAR TUMORS INDUCED BY POLYOMA VIRUS IN PREGNANT RATS.

(Eng.) Vandeputte, M. (Rega Inst. Univ. Leuven, B-3000 Leuven, Belgium); Meyer, G.; Sobis, H. *J Natl Cancer Inst* 56(3): 517-521; 1976.

Female R (inbred Wistar albino) rats, mated with an R male and inoculated in utero with polyoma virus after ''fetectomy'', developed hemangiomas or hemangiosarcomas. These tumors originated in the uterus and were of fetal origin (visceral yolk sac). The hemangiosarcomas were transplantable and grew in tissue culture. Infectious polyoma virus could not be isolated from the tumor cells kept as transplantable lines or cultured in vitro. However, the tumor cells were positive for the polyoma-specific surface antigen, polyoma tumor-specific transplantation antigen(s), and polyoma nuclear T antigen.

0167 THE PROPERTIES OF A POLYOMA VIRUS MUTANT, TS3.

(Eng.) Dulbecco, R. In: *Tumor Virus-Host Cell Interaction.* Edited by A. Kolber. New York, Plenum Press, pp. 149-151; 1975.

A temperature-sensitive (ts) polyoma virus mutant, ts3, was described. Ts3 is temperature sensitive in transformation and lytic infection. Topoinhibition is low at low temperatures and higher at high temperatures, reflecting changes in serum requirement in crowded cell layers. The morphology of transformed cells changes with temperature, suggesting that continued expression of this mutation is needed for transformation. Several cell lines (BALBc/3T3 and PY6) were tested for virus yield or production of infectious viral DNA at 32 C and 39 C. Temperature-sensitivity proved to be cell-dependent. BALBc/3T3 cells were stimulated with serum at various times before and after infection. A lower ratio of yield was obtained when the serum was added 16-18 hr before infection, suggesting that the physiological state of the cell may influence the expression of the gene. The infectivity of purified viral DNA is not temperature-sensitive in BALBc/3T3 cells. Mutation is expressed very soon after infection. Ts3 will not complement with any other polyoma mutants in BALBc/3T3 cells at 39 C. This suggests that the mutation affects a virion protein. More research is needed to determine the nature of this mutation.

0168 BRIEF COMMUNICATION: MALIGNANT TRANSFORMATION OF HAMSTER BRAIN CELLS IN VITRO BY HUMAN PAPOVAVIRUS BK. (Eng.) Tanaka, R. (Wistar Inst. Anatomy and Biology, 36th and Spruce Sts., Philadelphia, PA 19104); Koprowski, H.; Iwasaki, Y. *J Natl Cancer Inst* 56(3): 671-673; 1976.

Human papovavirus BK caused the malignant transformation in vitro of brain cells prepared from newborn Syrian hamsters. The transformed cells produced BK virus T antigen and grew as tumors after sc inoculation into hamsters that developed antibodies to BK virus T antigen. The histopathology of the tumors revealed an undifferentiated glioma. The results show that cultured hamster neuroglial cells are susceptible to malignant transformation by BK virus.

0169 INFECTIVITY, ONCOGENICITY AND TRANSFORMING ABILITY OF BK VIRUS AND BK VIRUS DNA. (Eng.) van de Noordaa, J. (Laboratorium voor de Gezondheidsleer, Universiteit van Amsterdam, Mauritskade 57, Amsterdam, The Netherlands). *J Gen Virol* 30(3): 371-373; 1976.

BK virus was tested for oncogenicity and transformation ability. The human papovavirus, BK, appeared weakly oncogenic in newborn hamsters (eight tumors/155 animals after one year) and induced in vitro transformation of Wistar rat kidney cells. The infectivity of BK virus DNA was determined by the DEAE-dextran method. In human embryonic cells the infectivity was approximately 10^5 p.f.u./μg of DNA. The transforming ability of BK virus in primary rat kidney cells was measured by the calcium method and appeared to vary from 1 to 10 foci per μg of DNA.

0170 BRIEF COMMUNICATION: RELATIONSHIP BETWEEN THE MASON-PFIZER MONKEY VIRUS AND HeLa VIRUS: IMMUNOELECTRON MICROSCOPY. (Eng.) Gelderblom, H. (Virusabteilung, Robert Koch-Inst. des Bundesgesund-heitsamtes, Nordufer 20, D-1000 Berlin 65, W. Germany); Schwarz, H. *J Natl Cancer Inst* 56(3): 635-637; 1976.

Envelope antigens of the Mason-Pfizer monkey virus (MPMV) and the morphologically similar HeLa virus (continuously produced in some HeLa lines), were compared by indirect immunoferritin techniques. Antisera against MPMV and HeLa virus revealed cross-reacting antigenic specificities on the surfaces of both agents, and cross-absorption and end-point dilution techniques indicated the presence of identical envelope antigens. The results demonstrate a close relationship, if not an identity, between MPMV and HeLa virus.

0171 PROSTAGLANDIN PRODUCTION IN CULTURES OF BALB/3T3 AND SV3T3 MOUSE FIBROBLASTS. (Eng.) Ritzi, E. M. (Inst. Cancer Res., 99 Fort Washington Ave., New York, NY 10032); Stylos, W. A. *J Natl Cancer Inst* 56(3): 529-533; 1976.

The concentration of various prostaglandins (PG's) was determined in both cells and medium of growing BALB/3T3 and BALB/3T3 (3T3) cultures transformed by simian virus 40 (SV3T3). Most PG's were found in the medium rather than in the cells. The larger PG measurements were PGE and a composite measurement of PGA and PGB. PGF was detected at lower levels. The sum of PGE and the composite measurement (PGA+PGB) was the best indication of PG production in culture. When 2-day medium collections from 3T3 and SV3T3 cells were measured by radioimmunoassay, higher concentrations of PG were detected in the media of SV3T3 cultures. This difference in PG production was not due merely to differences in cell density, since SV3T3 cells produced higher PG concentrations, even at equal cell densities. PG production for a 2-day interval was a function of cell type rather than of cell density.

0172 CHANGES IN HL-A ANTIGEN PROFILES ON SV40-TRANSFORMED HUMAN FIBROBLASTS. (Eng.) Pellegrino, M. A. (Scripps Clinic and Res. Foundation, La Jolla, CA 92037); Ferrone, S.; Brautbar, C.; Hayflick, L. *Exp Cell Res* 97(2): 340-345; 1976.

The histocompatibility antigen profile of human fibroblasts transformed with simian virus 40 (SV40) was investigated by determining their ability to specifically absorb HL-A alloantisera. All four human adult skin fibroblast lines acquired, after SV40 transformation, the ability to absorb the HL-A alloantiserum VICTOR directed against the specificities HL-A5, W5. On the contrary, none of six embryonic fibroblast lines showed any qualitative or quantitative change of their HL-A antigenic profile. Similarly, murine, monkey and hamster cells could not absorb the activity of the HL-A alloantiserum VICTOR after SV40 transformation. It is suggested that the "new HL-A antigen" specificity on human fibroblasts after SV40 transformation may be due to either a cross-reaction between HL-A specificities and antigenic structures present on glycoprotein(s) coded by the viral genome and expressed on the cell, or to a change in the regulating mechanism of the expression of histocompatibility antigens on the cell surface, should the genetic information for all the HL-A specificities be present in the cell genome.

0173 EXPRESSION OF SV40 T ANTIGEN DURING INHIBITION OF DNA SYNTHESIS. (Eng.) Zeuthen, J. (Inst. Human Genetics, Bartholin Building, Univ. Aarhus, Universitetsparken, DK-8000 Aarhus C, Denmark); Stenman, S. *Cancer Lett* 1(4): 219-224; 1976.

The relation of T antigen expression to DNA replication in exponentially growing human SV40-transformed cells (WiSV40) was studied. Treatment of the cells with excess thymidine or cytosine arabinoside caused a rapid decrease in the expression of T antigen as determined by quantitative immunofluorimetry. The results support the assumption that new synthesis of T antigen is inhibited and that the T antigen has a rapid turnover after addition of excessive thymidine.

0174 EFFECT OF FV-1 GENE PRODUCT ON SYNTHESIS OF N-TROPIC AND B-TROPIC MURINE LEUKEMIA VIRAL RNA. (Eng.) Jolicoeur, P. (Dept. Biology, Massachusetts Inst. Technology, 77 Massachusetts Ave., Cambridge, MA 02139); Baltimore, D. *Cell* 7(1): 33-39; 1976.

The production of virus and the synthesis of virus-specific RNA were studied in Fv-1n/n (NIH/3T3, SIM) and Fv-1b/b (BALB/3T3, SIM.R) cell lines after infection with N- or B-tropic MuLV. Virus production, measured by reverse transcriptase activity in the medium, was 70-100 fold lower in cells resistant at the Fv-1 locus than in permissive cells. The virus-specific RNA, detected by hybridization in RNA excess with complementary DNA, was reduced by approximately 70-100 fold in cytoplasm of resistant cells compared to permissive cells. There was also reduction of the same magnitude in the levels of virus-specific RNA extracted from nuclei of resistant cells. The data therefore show that virus-specific RNA levels are reduced in cells nonpermissive at the Fv-1 locus, suggesting that restriction of the Fv-1 gene product occurs at the level of transcription of the viral genome or at a pre-integration step, or, alternatively, that the RNA transcripts are rapidly degraded after their synthesis.

0175 CHROMOSOMALLY DEPLETED INTERSPECIFIC HYBRID CELL CLONES SELECTED WITH CYTOTOXIC ANTISERA: UTILIZATION IN THE STUDY OF CONTROL OF MURINE LEUKEMIA VIRUS HOST-RANGE. (Eng.) Collins, J. J. (Duke Univ. Medical Center, Durham, NC 27710); Destree, A. T.; Marshall, C. J.; Bernstein, A.; Macpherson, I. A. *J Supramol Struct* 4(1): 71(71)-88(88); 1976.

A chromosomally stable mouse-Chinese hamster hybrid cell line was subjected to five rounds of selection with cytotoxic antisera raised in rabbits against either the parental mouse 3T3 cells or the parental Chinese hamster Wg-1 cells. Routine karyological analysis of clones isolated at each stage of serum selection revealed that treatment with either serum resulted in a limited loss of chromosomes (compared to the untreated hybrid cell cultured in parallel) and that the pattern of chromosome loss could not be correlated with the particular antiserum used for selection. However, more detailed analysis with the SSC (NaCl plus $Na_3C_6H_5O_7$)-formamide C-banding technique, which identifies chromosomes containing a mouse centromere region, demonstrated that while large-scale chromosome loss was not achieved as a result of antiserum selection, the limited loss of chromosomes did reflect a specific depletion of chromosomes in response to treatment with cytotoxic antiserum. Specific chromosomal elimination was shown to occur as early as the first round of antiserum treatment. Antigenic analysis of the serum-selected clones revealed a quantitative decrease in the expression of the species-specific surface antigens selected against, but no qualitative loss of antigens was detected. The results suggest that treatment with cytotoxic antiserum may select for clones that have lost specific chromosomes bearing genes regulating the expression of species-specific surface antigens, rather than for those demonstrating large-scale depletion of chromosomes bearing the corresponding structural genes. Some of these chromosomally depleted hybrid cell clones were used (along with pseudotype viruses containing the genome of vesicular stomatitis virus within the envelope of murine leukemia virus, VSV [MuLV]) to study the mechanisms regulating MuLV replication in Chinese hamster cells. The results indicated that the restriction of MuLV replication in Chinese hamster cells operates at two levels: (a) an inability to adsorb to or penetrate Chinese hamster cells; and (b) an additional intracellular block that is dominant in the mouse-Chinese hamster hybrid cell clones examined.

0176 FV-4: A NEW GENE AFFECTING THE SPLENOMEGALY INDUCTION BY FRIEND LEUKEMIA VIRUS. (Eng.) Suzuki, S. (Chugai Pharmaceutical Co., Ltd., Takada, Tokyo 171, Japan). *Jpn J Exp Med* 45(6): 473-478; 1975.

Analysis of offspring from the mating of a Friend leukemia virus (FLV)-resistant new mouse line, G, and DBA/S mice confirmed the existence of a single dominant gene for the resistance of G to FLV. In these offspring, no correlation between resistance to FLV and hair-color genes (b, d and c) was observed. In the progeny of [(G x BALB/c) x DBA/2] mating, the resistance gene segregated independently from Fv-1. The allele(s) on Fv-1 locus in G mice seemed to be permissive to N-tropic virus. Therefore, concomitance of Fv-1b in G mice was excluded. These results indicated that the resistance gene in the new line mice differs from Fv-1 and Fv-2.

0177 STUDIES ON A GROSS-VIRUS-INDUCED LYMPHOMA IN THE RAT. III. OPTIMISATION, SPECIFICITY AND APPLICATIONS OF THE IN VITRO IMMUNE RESPONSE. (Eng.) Bruce, J. (Sch. Medicine, Univ. Pennsylvania, Philadelphia, PA 19104); Mitchison, N. A.; Shellam, G. R. *Int J Cancer* 17(3): 342-350; 1976.

Conditions were described for optimal stimulation in vitro of lymphocytes from WF, AS, and PVG rats primed in vivo with syngeneic murine leukemia virus (MuLV)-G leukemia cells. Cultures generated effector cells which showed high cytotoxic activity against leukemic cells. Specific stimulation could be obtained with leukemic cells and with disrupted MuLV. Leukemic cells, normal spleen cells and the viron internal protein p30 competitively inhibited effector cells, but purified virus exerted nonspecific inhibition. These findings appeared to support the hypothesis that virion antigens constitute a major target of anti-tumor cytotoxic immunity.

0178 EFFECTS OF POLY(1-VINYLURACIL) AND POLY(9-VINYLADENINE) ON VIRAL RNA-DIRECTED DNA POLYMERASE.

(Eng.) Pitha, J. (Baltimore City Hosps., Baltimore, MD 21224). *Cancer Res* 36(4): 1273-1277; 1976.

The effects of poly(1-vinyluracil) [poly(vU)] and poly(9-vinyladenine) [poly(vA)] on the RNA-dependent DNA polymerase activity of murine leukemia virus (Moloney strain) were studied. With polyribocytidylic acid as template and oligodeoxyguanylic acid as primer, neither poly(vU) nor poly(vA) had a significant effect; when polyribouridylic acid was used as template and oligodeoxyadenylic acid as primer, poly(vA) inhibited polymerase activity, while poly(vU) had little effect; when polyriboadenylic acid was a template and oligodeoxythymidylic acid was a primer, poly(vU) was an inhibitor. Complex effects were noted with the latter system and poly(vA): stimulation occurred at low poly(vA) concentrations, while inhibition occurred at high concentrations. The stimulation brought about a decrease in the amount of lower-molecular-weight materials in the product and was caused by the interaction of poly(vA) with the template-primer. The results show that vinyl polymers differ from polynucleotides in their mechanism of inhibition of viral polymerase, since the latter inhibit the enzyme by binding to it.

179 THYMIDYLATE SYNTHETASE OF IN VITRO CHEMICALLY AND VIRALLY TRANSFORMED RAT CELLS.

Eng.) Langenbach, R. (Univ. Nebraska Medical
enter, 42nd and Dewey Ave., Omaha, NB 68105).
iochim Biophys Acta 422(2): 295-301; 1976.

hymidylate synthetase (methylenetetrahydrofolate
'-deoxyuridylic acid (dUMP)-C-methyltransferase)
as investigated in vitro using 3-methylcholan-
hrene-transformed and Rauscher leukemia virus-
ransformed rat embryo cells. The Km values and
hanges in the specific activity of the enzyme
uring the culture cycle were compared in control
nd transformed cells. The ability of 5-fluoro-2'-
eoxyuridylic acid to form an isolatable covalent
omplex with thymidylate synthetase was used to
etermine the amount of enzyme in the control and
ransformed cells. The enzyme from control or
ransformed rat cells exhibited a Km for dUMP of
.5 ± 0.2 μM, but the transformants had a high-
level of enzyme activity than did control
ells. Titration of the enzyme with tritiated
UMP indicated that the increased enzyme activity
the transformants was due to a greater level of
ellular enzyme. While the level of enzyme activity
control cells was dependent on both the avail-
ility of nutrients in the medium and cell den-
ty, the level of enzyme activity in the transfor-
nts appeared to depend only on the availability
nutrients. Thus, treatment with these agents either directly or indirectly altered the level and cellular regulation of thymidylate synthetase.

0180 IMMUNOPATHOGENICITY AND ONCOGENICITY OF MURINE LEUKEMIA VIRUSES.

(Eng.) Del Villano, B. C. (Scripps Clinic and Res. Foundation, La Jolla, CA 92037); Croker, B. P.; McConahey, P. J.; Dixon, F. J. *Am J Pathol* 82(2): 299-314; 1976.

The pathologic consequences of infection of newborn mice (NZB, NZW, and [NZB x NZW]F_1) and rats (Le and BN) with murine leukemia virus (MuLV) (Scripps leukemia virus--SLV) were observed. Serum MuLV protein 30 (p30) concentrations of most strains were elevated 20 to 100 times that of controls, while MuLV glycoprotein 70 (gp70) levels were elevated only 1.1 to 14.8 times, probably reflecting in part the higher concentrations of gp70 in control sera but also indicating the lack of parallelism in regulation of synthesis of these two viral antigens. Infected mice of most strains developed immunologic diseases, including antinuclear antibody and glomerulonephritis, but not Coombs' antibodies. The nature and severity of the immunologic disease varied considerably, depending upon the genetic character of the host. Most infected animals developed lymphatic leukemias, but four strains showed partial to complete resistance to SLV oncogenesis: BALB/c (nude); C57 Bl/6; (NZB x NZW)F_1, and (NZW x BALB/c)F_1.

0181 TRANSMISSION OF MURINE LEUKEMIA VIRUS (SCRIPPS) FROM PARENT TO PROGENY MICE AS DETERMINED BY P30 ANTIGENEMIA.

(Eng.) Jenson, A. B. (Scripps Clinic and Res. Foundation, La Jolla, CA 72037); Groff, D. E.; McConahey, P. J.; Dixon, F. J. *Cancer Res* 36(4): 1228-1232; 1976.

The entire process of transmission of murine leukemia virus (Scripps) and subsequent infection was studied in mice by following the levels of p30, the major virion protein. All mice of C57BL/St, C3H/St, BALB/cSt, NZB/Scr, and NZW/Lac strains developed high levels of p30 antigenemia after inoculation at birth with the virus. Transmission of virus from neonatally infected parents to their progeny for three successive generations, as evidenced by development of p30 antigenemia, varied among the five strains. Through the three generations, 100% transmission occurred in C3H/St and BALB/cSt mice, 50-61% transmission occurred in C57BL/St and NZW/Lac mice, and 11% transmission to the first generation, with no subsequent transmission, occurred in the NZB/Scr mice. Transmission occurred readily via the milk in all strains. Intrauterine events also played a role, with evidence of some viral transfer prior to birth in the C3H/St strain or, conversely, the development of resistance to infection prior to birth in C57BL/St mice. The occurrence of litters from infected parents containing both normal offspring and offspring with elevated p30 appeared to be the result of variable resistance in the intact offspring, perhaps due to intrauterine events, and not related to cellular resistance or to dominant genetic factors.

0182 UNUSUALLY HIGH INCIDENCE OF SPONTANEOUS MAMMARY CARCINOMATA IN A COLONY OF BALB/C MICE. (Eng.) Fieldsteel, A. H. (Stanford Res. Inst., Menlo Park, CA 94025); Dawson, P. J.; Kurahara, C.; Brooks, R. E. *Br J Cancer* 32(6): 741-744; 1975.

An unusually high incidence of spontaneous mammary tumors in a colony originating from the BALB/cCrgl mouse subline is reported. During a 6 yr observation period (1967-1972), 51.5% of 582 breeding females developed mammary tumors at a mean age of 10.7 ± 2.8 mo. The incidence peaked at a mean age of 1968 and declined to 27.8% in 1971, but rose again to 51.2% in 1972. All but one of 38 tumors belonged to Dunn's type B adenocarcinoma. The largest group (18 tumors) was predominantly glandular with small cysts and solid areas. All of six tumors examined ultrastructurally contained large numbers of type B virus particles. The data suggest that mammary tumor virus was transmitted vertically.

0183 SURFACE LOCALIZATION OF VIRUS PRODUCTION ON A GLUCOCORTICOID-STIMULATED ONCORNAVIRUS-PRODUCING MOUSE MAMMARY TUMOR CELL LINE BY SCANNING ELECTRON MICROSCOPY. (Eng.) Gonda, M. A. (Frederick Cancer Res. Center, Frederick, MD 21701); Arthur, L. O.; Zeve, V. H.; Fine, D. L.; Nagashima, K. *Cancer Res* 36(3): 1084-1093; 1976.

A chronically infected continuous mouse mammary tumor cell line containing virus particles of type B morphology, free of contaminating type C virions, was grown in tissue culture. These cells were treated with dexamethasone (10^{-5} mole), a potent stimulator of mouse mammary tumor virus expression. Surfaces of untreated and dexamethasone-treated cells were investigated by scanning electron microscopy. Untreated cells demonstrated a moderate expression of mouse mammary tumor virus (80 particles/cell) distributed diffusely over the cell surface. However, virions on dexamethasone-treated cells were localized in clusters of 100 to greater than 2,000 virus particles, often with more than one cluster per cell. Dexamethasone-treated cells typically showed a 10-fold increase in cell-associated virus over untreated cells. Dexamethasone-treated culture fluids demonstrated a similar 10-fold increase of extracellular particles, in contrast to untreated cultures. This increase in virus particles on the cell surfaces as well as in the extracellular fluids supports the theory that dexamethasone has a stimulatory effect on viral replication, not just on the release of budding particles. The ultrastructure of budding mouse mammary tumor virus during dexamethasone stimulation, determined by scanning and transmission electron microscopy, and the significance of such an in vitro system for viral immunodiagnosis are discussed.

0184 INTRACELLULAR FORMS OF ADENOVIRUS DNA IN PRODUCTIVELY INFECTED CELLS: EVIDENCE FOR INTEGRATION OF THE VIRAL GENOME. (Eng.) Doerfler, W.; Burger, H. Lundholm, U.; Rensing, U. In: *Tumor Virus-Host Cell Interaction. NATO Advanced Study Institutes Series: Series A, Life Sciences*, vol. 5. Edited by Kolber, A. New York, Plenum Press, 1975, pp. 155-181.

In order to understand the mechanism of replication of adenovirus DNA in productively infected human cells, the intracellular forms of newly synthesized DNA were studied. KB cells growing in monolayers were inoculated with CsCl-purified adenovirus type 2 (Ad2) at a multiplicity of 100 plaque-forming units/cell. At various times after infection, the cells were labeled with ^{3}H-uridine or ^{3}H-thymidine. In some experiments the cells were prelabeled with ^{14}C-thymidine. The intracellular DNA was extracted after lysis of the cells with sodium dodecyl sulfate or with alkali and was analyzed in dye-buoyant density gradients or by zonal centrifugation in neutral or alkaline sucrose gradients. There was no evidence that parental or newly synthesized Ad2 DNA becomes supercoiled. A virus-specific DNA-RNA complex was isolated in dye-buoyant density gradients. This complex is probably involved in transcription. In CsCl density gradients, viral DNA of high buoyant density was observed to be a precursor to virion DNA by pulse-chase experiments. These molecules are in part single-stranded. In alkaline sucrose gradients, viral DNA sedimenting at a rate of 50-90S was found. The evidence suggests that this DNA may represent an integrated form of the viral genome.

0185 IN VITRO TRANSCRIPTION OF ADENOVIRUS 2 DNA. I. CHARACTERIZATION OF PROMOTERS FOR *E. COLI* RNA POLYMERASE. (Eng.) Surzycki, S. J. (Depts. Botany and Zoology, Univ. Iowa, Iowa City, IA 52242); Surzycki, J. A.; Gussin, G. N. *Mol Gen Genet* 143(2): 167-175; 1976.

Escherichia coli RNA polymerase holoenzyme can recognize transcription initiation sites on Adenovirus 2 (Ad 2) DNA that are functionally indistinguishable from promoters for the enzyme on phage DNAs; the complexes formed between the polymerase and the DNA at these sites can exist in two states - either as I (initiation) complexes, from which rapid RNA chain initiation is not possible, or as RS (rapid starting) "rifampicin resistant" complexes, from which rapid RNA chain initiation can occur. When transcription was limited to that initiated from stable, rifampicin-resistant pre-initiation complexes, initiation was strictly dependent on the presence of sigma factor; in addition, the frequency of initiation exhibited sigmoidal dependence on the temperature at which pre-initiation complexes are allowed to form, with a transition temperature of 26-28 C. The average half-time for initiation of RNA chains from sites on Ad 2 DNA was shown to be comparable to half-times for initiation of RNA chains from promoters on T7 and λ DNAs. At saturating levels of enzyme, the half-times are 0.6, 0.9, and 1.6 sec for λ b2, Ad 2 and T7 DNAs, respectively. The existence of efficient, phage-like promoters for *E. coli* RNA polymerase on Ad 2 DNA suggests that such promoters may be closely related functionally and spatially to promoters for mammalian RNA polymerases.

0186 IN VITRO TRANSCRIPTION OF ADENOVIRUS 2 DNA: II. QUANTIFICATION AND LOCALIZATION OF PROMOTERS FOR *E. COLI* RNA POLYMERASE. (Eng.) Surzycki, S. J. (Dept. Botany and Zoology, Univ. Iowa, Iowa City, IA 52242); Surzycki, J. A.; DeLorbe, W.; Gussin, G. N. *Mol Gen Genet* 143(2): 177-184; 1976.

The capacity of *Escherichia coli* RNA polymerase to form stable, rifampicin-resistant, pre-initiation complexes with Adenovirus 2 (Ad 2) DNA was estimated to be at three to six binding sites. The number of RNA chains initiated from such complexes was determined from the incorporation of γ-^{32}P-ATP and guanine triphosphate (GTP) at two rifampicin concentrations (7 μg/ml and 24 μg/ml), and after pre-incubation at either 25 or 37 C. The total number of RNA chains initiated ranges from 2.6 per Ad 2 DNA molecule at a rifampicin concentration of 24 μg/ml and pre-incubation temperature of 25 C, to 5.4 per Ad 2 DNA molecule at a rifampicin concentration of 7 μg/ml and pre-incubation temperature of 37 C. Efficient initiation with GTP occurs only after pre-incubation at 37 C, whereas initiation with ATP is equally as efficient at either pre-incubation temperature. Promoters for initiation with ATP have been localized to the leftmost 58% of the Ad 2 DNA molecule, defined by the *Eco*RI restriction endonuclease fragment A; promoters for initiation with GTP are located on the remaining 42% of the Ad 2 DNA molecule. It is likely that on Adenovirus 2 DNA, each RNA chain is initiated from a unique binding site which constitutes a separate promoter for *E. coli* RNA polymerase.

0187 CHARACTERIZATION AND METABOLISM OF NUCLEAR VIRAL RNA SYNTHESIZED 18 HOURS AFTER INFECTION WITH ADENOVIRUS 2. (Eng.) Brunner, M.; Raskas, H. J. In: *Tumor Virus-Host Cell Interaction. NATO Advanced Study Institutes Series: Series A, Life Sciences*, vol. 5. Edited by Kolber, A. New York, Plenum Press, 1975, pp. 237-252.

Nuclear viral RNA was studied in cultured human cells (KB) productively infected with adenovirus type 2. The nuclear RNA synthesized beginning 18 hr after infection was at least 50% virus specific. Only 10% of the nuclear RNA bound to poly U filters. Over half of newly synthesized nuclear viral RNA sedimented at greater than 28S, whereas cytoplasmic viral messenger RNA was of the size range 10S-28S. Nuclear RNA greater than 28S bound to poly U filters 5% and nuclear RNA in the size range 10S-28S bound nearly 20%.

188 LOCATION AND IDENTIFICATION OF THE GENES FOR ADENOVIRUS TYPE 2 EARLY POLYPEPTIDES. Eng.) Lewis, J. B. (Cold Spring Harbor Lab., Cold pring Harbor, NY 11724); Atkins, J. F.; Baum, P. .; Solem, R.; Anderson, C. W. *Cell* 7(1): 141-151; 976.

irus-specific RNA was prepared from transformed odent cell line 8617, and the F17 and 14b cell ines, early after adenovirus type 2 infection, and fractionated by hybridization to specific fragments of viral DNA. The viral mRNA was used to program cell-free protein synthesis, and the products were analyzed by electrophoresis. The genes for the early polypeptides of apparent molecular weight 44,000, 15,000, 72,000, 15,500, 19,000, and 11,000 daltons were located, respectively, between positions 0-4.1, 4.1-16.7, 58.5-70.7, 75.9-83.4, 89.7-98.6, and 89.7-98.6 of the conventional adenovirus DNA map. The polypeptide of molecular weight 72,000 daltons was the previously described single-strand DNA-binding protein. RNAs from three different adeno-transformed cell lines each programmed the synthesis in vitro of the 15K polypeptide, predominantly, as well as variable amounts of the polypeptide of molecular weight 44,000 daltons. The genes for these two polypeptides were located in the portion of DNA required for transformation of rodent cells by adenovirus.

0189 UNRELATED ANIMAL VIRUSES SHARE RECEPTORS. (Eng.) Lonberg-Holm, K. (Central Res. and Development Dept., Experimental Station, E. I. du Pont de Nemours and Co., Wilmington, DE 19898); Crowell, R. L.; Philipson, L. *Nature* 259(5545): 679-681; 1976.

A ''receptor map'' for a number of non-enveloped viruses was constructed. The attachment of highly purified ^{14}C-, ^{35}S-, or ^{32}P-labeled particles to HeLa cells was measured. Pretreatment with excess virus was usually for 15 min at 34.5 C, but 60 min at 22 C, or no pre-incubation but using a larger excess of unlabeled particles, gave compatible results. Excess unlabeled human rhinovirus type 2 (HRV-2) and type 14 (HRV-14), Coxsackie virus type A21 (CA21), and type B3 (CB3), poliovirus type 2 (P2), and adenovirus type 2 (Ad2) were used to saturate cell receptors. Pools of purified virus contained 1 x 10^{13} to 3 x 10^{13} particles per ml, and when labeled, 0.6 x 10^6 to 6 x 10^6. Efficient attachment of virus radioactive virus to the cells required warming of the mixture. Homologous competition for receptors was tested and detected in every experiment using excess virus or antigens. The results showed that there are four receptor families: the first family contains HRV-2; the second family contains HRV-14 and CA21; the third family contains P2; and the fourth family contains CB3 and Ad2.

0190 SUPERINFECTION WITH ADENOVIRUS OF LYMPHOBLASTOID CELL LINES. (Eng.) Chardonnet, Y.; Perrinet, M. C.; Faucon, N. In: *Oncogenesis and Herpesviruses II. Part 1: Biochemistry of Viral Replication and In Vitro Transformation. Proceedings of a Symposium held in Nuremberg, Federal Republic of Germany, 14-16 October 1974.* International Agency for Research on Cancer, Lyon, France: IARC Scientific Publications No. 11, pt. 1, pp. 497-500; 1975.

Interactions between adenovirus 5 and lymphocytes were studied using normal and Epstein-Barr virus (EBV)-transformed lymphocytes. Two cell lines from Burkitt's lymphoma patients were used: Jijoye (EBV-producing) and Raji (nonproducing). Adenovirus 5 was able to multiply in both cell lines and caused no changes in the growth of either. Immunofluorescence testing showed that the adenovirus was capable of inducing synthesis of EBV capsid antigen, particularly in the Raji cells. Further testing confirmed that adenovirus 5 infection results in the derepression of the latent EBV genomes in the Raji cells, up to structural antigen synthesis.

0191 CONCATEMERS OF ALTERNATING PLUS AND MINUS STRANDS ARE INTERMEDIATES IN ADENOVIRUS-ASSOCIATED VIRUS DNA SYNTHESIS.

(Eng.) Straus, S. E. (Natl. Inst. Allergy and Infectious Diseases, Natl. Inst. Health, Bethesda, MD 20014); Sebring, E. D.; Rose, J. A. *Proc Natl Acad Sci USA* 73(3): 742-746; 1976.

Replicating DNA molecules of adenovirus-associated virus (AAV) were selectively extracted from KB cells coinfected at 39.5 C with a DNA minus, temperature-sensitive mutant of adenovirus 5 (ts125) as helper. Under these conditions AAV DNA replication proceeded normally, but there was little, if any, adenovirus DNA synthesis. An analysis of the replicating molecules in sucrose density gradients revealed that there were AAV DNA intermediates that consisted of covalently linked plus and minus DNA strands. Under denaturing conditions, these concatemers were linear single strands whose lengths reached at least four times the size of the AAV genome. The most abundant concatemeric species was a dimer, which presumably existed in vivo as a unit length hairpin. Unit length linear duplexes appeared to be immediate precursors of plus and minus progeny strands. These findings are compatible with a self-priming mechanism for the synthesis of AAV DNA.

0192 ELECTRON MICROSCOPE STUDY OF EXPERIMENTAL ENTERIC ADENOVIRUS INFECTION IN MICE.

(Eng.) Takeuchi, A. (Walter Reed Army Inst. Res., Washington, DC 20012); Hashimoto, K. *Infect Immun* 13(2): 569-580; 1976.

Using fluorescent antibody techniques (FA) and light microscopy (LM) and electron microscopy (EM), this paper describes the morphological features of the ileum in the DK1 mouse orally challenged with adenovirus K87. At the peak of infection, virus was easily identified by FA in the epithelium of the villi and crypts of the ileum. LM showed that fluorescent cells have large, bizarre, uniformly basophilic nuclei containing DNA, as indicated by histochemical tests. EM further identified these nuclei as belonging to columnar, goblet, or Paneth cells, all epithelial cells facing the lumen with a microvillus border. The basophilic material in the nuclei consisted of virus particles 75 nm in diameter arranged in crystalline arrays. When found in the cell cytoplasm, the virions did not form arrays but were scattered or formed irregular aggregates, which may or may not be enclosed by single membranes. Infected columnar cells showed mild cytopathic effects with no cell degeneration and necrosis, whereas the goblet and Paneth cells appeared normal and maintained synthetic and secretory functions. All infected cells, however, share an abnormally accelerated extrusion rate, with columnar and goblet cells often being shed from the side rather than from the tip of the villi. The Paneth cells, which do not migrate out of the crypts, showed a higher than normal rate of extrusion in the crypt lumen.

0193 HERPES-SIMPLEX-VIRUS ANTIGENS IN NORMAL CERVICAL CELLS (Letter to Editor).

(Eng.) Pacsa, A. S. (Virus Lab., Inst. Microbiology, Univ. Medical Sch., Pecs, Hungary); Kummerlander, L.; Pejtsik, B.; Simon, M.; Pali, K. *Lancet* 1(7959): 597; 1976.

Herpes-simplex virus-specific antigens were demonstrated in 9% of the cervical smears taken from 530 women with normal cervical epithelium as determined by pelvic examination and cytology. Of the 47 women positive for the antigen, colposcopy and histological diagnosis demonstrated 36 to have normal cervical epithelium. The results may support the initiating role of herpesvirus genitalis in the development of cervical cancer.

0194 LONG-TERM FOLLOW-UP STUDIES ON HERPES SIMPLEX ANTIBODIES IN THE COURSE OF CERVICAL CANCER. II. ANTIBODIES TO SURFACE ANTIGEN OF HERPES SIMPLEX VIRUS INFECTED CELLS.

(Eng.) Christenson, B. (Statens Bakteriologiska Laboratorium, S-105 21 Stockholm, Sweden); Espmark, A. *Int J Cancer* 17(3): 318-325; 1976.

In a serological follow-up of 88 women with active invasive cervical carcinoma, antibodies to membrane antigen of Herpes simplex virus (HSV)-infected cells were measured by the use of the mixed hemadsorption method. Sera were collected at the time of initial treatment and then at regular intervals. As controls, 85 healthy age-matched women and 70 patients suffering from other types of cancer were tested similarly. During the 6- to 60-mo observation period, 16 patients in the cervix carcinoma group died. The reactivity with membrane antigen of HSV-infected cells was positive in 71% of the cervical carcinoma patients, whereas the figure for the other cancer group was 27% and for the age-matched control group 27%. In the group of 16 patients who died, only three demonstrated antibodies against surface antigens of HSV-infected cells. In most cases radiation treatment of the tumor did not significantly alter the mixed hemadsorption titer but in ten surviving patients there was a significant increase in reactivity as the tumor was treated; one patient who had recurrence of cancer lost reactivity in later sera. Among the 11 cervix carcinoma patients in stage I (by clinical definition carcinoma strictly confined to the cervix) all but one showed positive reaction against the surface antigen of HSV-infected cells; the patient lacking reactivity was the only one out of the 11 patients in stage I who had a recurrence of cancer. The results confirm that low or missing antibody titers to membrane antigen of HSV-infected cells are of prognostic significance, and decreasing antibody titers to membrane antigens run parallel to the severity of the lesions. There was poor correlation between antibody titers against membrane antigens and neutralizing antibody titers.

0195 A NEARBY INVERTED REPEAT OF THE TERMINAL SEQUENCE OF HERPES SIMPLEX VIRUS DNA. (Eng.) Hyman, R. W. (Milton S. Hershey Medical Center, Pennsylvania State Univ., Hershey, PA 17033); Burke, S.; Kudler, L. *Biochem Biophys Res Commun* 68(2): 609-615; 1975.

Measurements of the inverted repeat of the terminal sequence for two strains of herpes simplex virus (HSV)-1 DNA were made. When HSV DNA was digested with lambda-exonuclease, annealed, and mounted for observation in the electron microscope, two types of molecules were seen. One type was circular DNA which formed because the enzyme had revealed the terminal repetition and the other was a full length linear duplex DNA with a short single-stranded loop on one end. This latter type, which apparently represents a fold-back reaction, forms because there is a nearby inverted repeat of the terminal sequence of herpes simplex virus DNA. The distance between the terminal sequence and its inverted repeat was the length of the end loop, measured to be 700 ± 150 bases for HSV-1 (Patton) DNA and 500 ± 100 bases for HSV-1 (KOS) DNA. No molecules with end loops at both ends were observed; however, the frequency of appearance of one end loop molecule was approximately 10%. The significance of this nearby inverted repeat of a terminal DNA sequence to herpesvirus molecular biology is under investigation.

0196 HERPES SIMPLEX INFECTION STOPS SPONTANEOUS BEATING OF CHICK HEART CELLS. (Eng.) Batra, G. K. (Emory Univ. Sch. Medicine, Atlanta, GA 30303); Nahmias, A. J.; DeHaan, R. L. *Nature* 259(5545): 677-679; 1976.

The effects of herpes simplex viruses (HSV) types 1 and 2 on chick embryo heart cells were studied. Cell monolayers were prepared; heart cell monolayers and aggregates were inoculated for most experiments with HSV-1 (VR_3 strain) at multiplicities of infection (MOI) between 0.25 and 200 plaque forming units (PFU) per cell. After 90 min, the preparations were washed and reincubated. HSV infection of heart cells in monolayer culture caused the cells to round up within 6-12 hr and stop beating. When the virus was added to cell suspensions on a gyratory shaker at the beginning of aggregation, cells either failed to aggregate or formed irregular clumps of loosely attached ells. Preformed spheroidal aggregates were inocuated with HSV 24 hr after gyration. At the time of noculation, 98-100% of the aggregates beat, but only 14% continued beating 9 hr later and none ere beating after 21 hr. The mean beating rate of ells and aggregates increased by 25-30% over the ontrol rate 3 hr after inoculation and then delined gradually before beating stopped; this may e due to depolarization. An MOI greater than 2.5 was required to stop the beating of either single cells or aggregates within 24 hr. Viral infection had not caused the cell membranes to become permeable at 12 hr; this was determined by Trypan blue dye exclusion tests. The brief interval (3 to 6 hr) between inoculation and the effects on beating rate suggests a subtle alteration in the infected cell membranes as the underlying cause of these physiological changes.

0197 TRANSFORMED CELL LINES PRODUCED BY TEMPERATURE-SENSITIVE MUTANTS OF HERPES SIMPLEX TYPES 1 AND 2. (Eng.) Macnab, J. C. M. In: *Oncogenesis and Herpesviruses II. Part 1: Biochemistry of Viral Replication and In Vitro Transformation. Proceedings of a Symposium Held in Nuremberg, Federal Republic of Germany, 14-16 October 1974.* International Agency for Research on Cancer, Lyon, France, IARC Scientific Publications No. 11, pt. 1, pp. 227-235; 1975.

The formation of foci of morphologically altered cells in rat embryo cells infected in the nonlytic cycle by herpes simplex virus (HSV) was studied. Lines grown from these foci had the characteristic longevity of transformed lines. They entered a characteristic crisis phase from which they invariably recovered. Superinfection with other ts mutants showed the transformed lines to consist of resistant and permissive cells, producing the small plaque characteristic of cell restriction of virus. A line of transformed rat cells produced tumors in the homologous host after host immunosuppression. However, no virus-specific fluorescence was unequivocally demonstrated.

0198 TRANSFECTION EXPERIMENTS WITH NUCLEIC ACIDS FROM HERPES SIMPLEX VIRUS TUMOUR CELLS. (Eng.) Sprecher-Goldberger, S.; Thiry, L.; Vandenbussche, P.; Cogniaux, J.; Prevost, J. M. In: *Oncogenesis and Herpesviruses II. Part 1: Biochemistry of Viral Replication and In Vitro Transformation. Proceedings of a Symposium held in Nuremberg, Federal Republic of Germany, 14-16 October 1974.* International Agency for Research on Cancer, Lyon, France: IARC Scientific Publications No. 11, pt. 1, pp. 501-504; 1975.

HEp-2 cells were transfected with nucleic acids extracted from the 333-8-9 hamster cell line (transformed with herpes simplex virus 2), or from solid tumors (induced in hamsters by transformed cells). HSV antigens could be detected in the transfected cells by ^{51}Cr release with immune lymphocytes four times out of five with nucleic acids from 333 cells. Three of four tumors tested were also positive. Due to variability of the radioactivity counts in the cytotoxicity assays, it was necessary to confirm the results with a radioimmunoassay. The results showed that while antigen induction could be detected by both the immune lymphocytotoxicity test and the radioimmunoassay, the accuracy of both tests needs to be improved.

0199 GENETIC AND PHYSIOLOGICAL STUDIES WITH HERPES SIMPLEX VIRUS TYPE 2 TEMPERATURE-SENSITIVE MUTANTS.

(Eng.) Timbury, M. C.; Hay, J. In: *Oncogenesis and Herpesviruses II. Part 1: Biochemistry of Viral Replication and In Vitro Transformation. Proceedings of a Symposium Held in Nuremberg, Federal Republic of Germany, 14-16 October 1974.* International Agency for Research on Cancer, Lyon, France, IARC Scientific Publications No. 11, pt. 1, pp. 219-225; 1975.

A stable mutant of herpes simplex wild-type virus, HSG 52, that forms plaques of flat syncytia (*syn* morphology) was used as a third marker in recombination experiments. Three temperature sensitive mutants, ts 6, 9, and 10 were obtained in this *syn* form. A recombinant with wild-type temperature-sensitivity from a recombination test between ts6 and ts9 made viral DNA with the same kinetics and to the same extent as the wild- type, but the inability of the ts9 parent to inhibit host cell DNA synthesis was not seen in the recombinant. BHK cells were infected with both ts6 and ts9 and incubated at room temperature. About 3% of the DNA synthesis seen in comparable wild-type infections was detected after 12 hr. DNA polymerase activity correlated with the amount of DNA synthesis. It is concluded from these results, and results from experiments in which cells were switched from restrictive to permissive conditions, that ts6 possesses a lesion in the structural gene for viral DNA polymerase, and that at the restrictive temperature, a nonfunctional enzyme protein is produced.

0200 ELECTRON-MICROSCOPIC STUDY OF HERPESVIRUS MACACA IN HUMAN FIBROBLASTS.

(Eng.) Graze, P. R. (UCLA Sch. Medicine, Los Angeles, CA 90024); McGrath, P.; Washington, G. C.; Royston, I. *Can J Microbiol* 22(1): 101-104; 1976.

An electron microscopic study of the morphology of *Herpesvirus macaca,* a serologically distinct infectious agent isolated from the WBC of rhesus monkeys, was performed. WI-38 fibroblast monolayers were infected with the virus and examined 18 days later. The morphology of *Herpesvirus macaca* was, in general, typical of the herpesvirus group. Enveloped virus particles observed via negative-stain technique had a diameter of 145-155 nm. An inner capsid composed of hexagonal capsomeres had a diameter of 100-110 nm and surrounded a central core. While enveloped forms appeared to be present within the nuclei of infected cells, they were not found in the cytoplasm except within vacuolar structures. Associated changes were found in the morphology of infected cells, including intracytoplasmic myelin figures. This study of the morphology of an Old World primate WBC-associated herpesvirus suggests that it closely resembles the schema determined earlier for the New World primate herpesviruses.

0201 IN VITRO INDUCTION OF EBV EARLY ANTIGENS IN NPC EPITHELIAL TUMOUR CELLS BY IUDR OR SUPERINFECTION (Letter to Editor).

(Eng.) Glaser, R. (International Agency Res. Cancer, 150, Cours Albert Thomas, 69008 Lyon, France); Lenoir, G.; Ho, J. H. C.; De-The, G. *Biomed Express* 23(10): 468-469; 1975.

Induction of Epstein-Barr virus (EBV) early antigen in epithelial tumor cells of nasopharyngeal carcinoma was achieved both by iododeoxyuridine (60 μg/ml) or by EBV superinfection (10^6 fluorescent forming units P_3 HR1 virus/ml). These results were obtained from two separate biopsies of one tumor taken 1 mo apart, and each biopsy contained over 90% EBV specific nuclear antigen before treatment. The results indicate that epithelial tumor cells in nasopharyngeal carcinoma contain inducible EBV genomes, and that epithelial cells of this carcinoma possess EBV receptors.

0202 CHARACTERIZATION OF EPSTEIN-BARR VIRUS (EBV) ANTIGENS. II. DETECTION OF EARLY ANTIGEN(S) USING ANTICOMPLEMENT IMMUNOFLUORESCENCE (ACIF) AND COMPLEMENT FIXATION (CF) TESTS.

(Eng.) Lenoir, G. (International Agency Res. Cancer, 150, Cours Albert Thomas, 69008 Lyon, France); Berthelon, M.-C.; Favre, M.-C.; De-The, G. *Biomed Express* 23(10): 461-464; 1975.

Using human sera having antibodies against Epstein-Barr virus (EBV) early antigens (EA) but lacking antibodies directed against the EBV nuclear antigen (EBNA), the detection of EBV/EA was possible both by the anticomplement immunofluorescent (ACIF) test and by the complement fixation (CF) test. Early antigens were induced either by superinfection of Raji cells with P3-HR1/EBV in the presence of cytosine arabinoside or by iododeoxyuridine induction. When an EA-positive, but EBNA-, CF/S-negative serum (B type) derived from nasopharyngeal carcinoma was used, this result was negative. Using an EA-negative, EBNA-, CF/S-positive serum (A type) from normal blood donors, positive CF tests were obtained with antigen prepared with both untreated and treated Raji cells. A classical EA picture was obtained when type B sera were tested by the ACIF test. The results indicate that EBV/EA can be detected by complement dependent tests, such as the ACIF test and the CF test. The authors conclude that the latter test is particularly useful for biochemical characterization and purification of EA.

0203 ANTIBODY-DEPENDENT LYMPHOCYTE CYTOTOXICITY AGAINST CELLS EXPRESSING EPSTEIN-BARR VIRUS ANTIGENS.

(Eng.) Pearson, G. R. (Mayo Clinic, Rochester, MN 55901); Orr, T. W. *J Natl Cancer Inst* 56(3): 485-488; 1976.

Antibody-dependent lymphocyte cytotoxicity (ADLC) was demonstrated against Epstein-Barr virus (EBV)-infected RAJI cells with peripheral blood lymphocytes from EBV-infected donors. No cytotoxic activity was detected against uninfected RAJI cells. This antibody-mediated cytotoxic reaction was directed against the same EBV-induced membrane antigens (MA) previously defined by the membrane immunofluorescence (MF) assay. Antibody to EBV-associated early antigens did not participate in his in vitro reaction. Antibody titers to EBV-nduced MA were significantly higher by the ADLC ssay in comparison with the MF test. A preliminary tudy showed no relationship between high antibody iters and the presence of EBV-associated malig-ancies. The results show that antibody against BV-associated MA is active in mediating in vitro estruction of MA-expressing cells by human periph-ral blood lymphocytes, and that the ADLC assay is ore sensitive in determining antibody titers to BV-induced MA than the membrane immunofluorescence est.

204 CYTOGENIC DIFFERENCES BETWEEN BURKITT'S LYMPHOMA AND OTHER EBV-RELATED HUMAN YMPHOBLASTOID CELL LINES. (Eng.) Jarvis, J. E. n: *Oncogenesis and Herpesviruses II. Part 1: iochemistry of Viral Replication and In Vitro ransformation. Proceedings of a Symposium Held in uremberg, Federal Republic of Germany, 14-16 ctober 1974.* International Agency for Research on ancer, Lyon, France: IARC Scientific Publications o. 11, pt. 1, pp. 483-489; 1975.

ymphoblastoid lines established from the periph-ral lymphocytes of infectious mononucleosis pa-ients or from fetal lymphocytes infected with pstein-Barr virus (EBV) in vitro were studied to etermine whether the additional band on the long rm of a number 14 chromosome in Burkitt's lymphoma as also present in these lines. The chromosomal bnormality was consistently present in both dip-oid and tetraploid cells of five long-established nd two new lines from Burkitt's lymphomas. In ontrast, the abnormality was never observed in ither the infectious mononucleosis peripheral ymphocytes (25 new lines) or the transformed etal lymphocytes (18 lines). It is concluded that he abnormality is not a specific indication of BV transformation, and that EBV may be able to stablish two different types of non-productive nfection.

205 SURFACE MARKER CHARACTERISTICS AND EPSTEIN-BARR VIRUS STUDIES OF TWO ESTAB-ISHED NORTH AMERICAN BURKITT'S LYMPHOMA CELL INES. (Eng.) Epstein, A. L. (Stanford Univ. Sch. edicine, Stanford, CA 94305); Henle, W.; Henle, .; Hewetson, J. F.; Kaplan, H. S. *Proc Natl Acad ci USA* 73(1): 228-232; 1976.

umor cell lines were established in continuous ulture to characterize the malignant cell popula-ion of two North American Burkitt's lymphomas. he SU-AmB-1 line, derived from a patient (12-yr-ld boy) with low serum antibody titers to Epstein-arr virus (EBV), was devoid of EBV genomes by the eaction for EBV-associated nuclear antigen (EBNA), ould not be induced to express EBV antigens, and as highly refractory to EBV superinfection. Con-ersely, the SU-AmB-2 cell line, derived from a atient (16-yr-old boy) with "African type" serol-gy, yielded a positive EBNA reaction and was eadily inducible and superinfectable. Although oth cell lines possessed B (bone-marrow-derived) ell characteristics, they had different surface marker patterns. It is postulated that two different classes of undifferentiated B cell lymphomas exist: one is positive for the presence of EBV genomes and occurs endemically in Africa and New Guinea and sporadically in other parts of the world; the other is EBV-negative and occurs sporadically throughout the world, including the endemic areas.

0206 EPSTEIN-BARR VIRUS INTERACTIONS WITH HUMAN LYMPHOCYTE SUBPOPULATIONS: VIRUS ADSORPTION, KINETICS OF EXPRESSION OF EPSTEIN-BARR VIRUS-ASSOCIATED NUCLEAR ANTIGEN, AND LYMPHOCYTE TRANSFORMATION. (Eng.) Menezes, J. (Sainte-Justine Hosp., Montreal H3T 1C5, Canada); Jondal, M.; Leibold, W.; Dorval, G. *Infect Immun* 13(2): 303-310; 1976.

To elucidate Epstein-Barr virus (EBV)-lymphocyte interactions, a chain of events was investigated including the following: EBV binding to human lymphocyte subpopulations; the earliest appearance of EBV-determined nuclear antigen (EBNA) in the lymphocytes after EBV infection; and establishment of continuous lymphoblastoid cell lines (LCL) by infecting with EBV different types of lymphocyte preparations from the same as well as from different donors. Direct membrane immunofluorescence assay showed that only a small fraction of human peripheral blood and cord blood lymphocytes (CBL), and possibly less than 31% of the T cell-depleted lymphocyte population, carry receptors for P3HR-1 strain of EBV. The number of cells carrying receptors for EBV did not vary considerably among different blood lymphocyte populations from several normal donors. EBV adsorption on lymphocyte subpopulations showed that purified thymus-dependent (T) cells and thymocytes did not adsorb EBV, in contrast to T cell-depleted lymphocyte populations and lymphoid cells from fetal liver and spleen. In CBL infected with EBV strain B95-8, EBNA was detected by anti-complement immunofluorescence as early as 18 hr after infection. This indicates that EBNA is the earliest detectable EBV-determined intracellular antigen to appear after infection and before or during lymphocyte transformation by EBV. Transformation was observed in lymphocyte cultures containing detectable thymus-independent B cells but not in cultures of purified T cells. With one exception (ES-B-1), all the EBV-transformed LCL from different origins carried surface-bound immunoglobulins (a B cell marker). These also included the 10 LCL obtained by infecting cultures of adherent cells from different donors. With regard to its surface markers, ES-B-1 appeared to be an exceptional EBV genome-carrying line, and it also lacked the ability to form spontaneous rosettes with sheep erythrocytes (a T cell marker). Therefore, it is possible that ES-B-1 was derived from an atypical B cell or B cell precursor or from a so-called ''null cell'' transformed by EBV.

0207 GROWTH IN SEMISOLID AGAR MEDIUM OF HUMAN CORD LEUKOCYTES FRESHLY TRANSFORMED BY EPSTEIN-BARR VIRUS. (Eng.) Mizuno, F. (Hokkaido Univ. Sch. Medicine, Sapporo, Japan); Aya, T.; Osato, T. *J Natl Cancer Inst* 56(1): 171-173; 1976.

The semisolid agar method for the selective growth of transformed cells was applied to investigations of Epstein-Barr virus (EBV) transformation. When 10^5 human umbilical cord blood leukocytes were seeded in agar medium immediately after EBV exposure, about 100 colonies developed in each dish. The occurrence of colonies correlated well with dilutions of EBV inoculum. The colonies were composed of lymphoblasts, were positive for EBV-determined nuclear antigen immunofluorescence, and consistently resulted in the establishment of cell lines. In EBV-infected cord leukocyte cultures, cells capable of growing in semisolid agar medium appeared early and increased rapidly, though the total numbers of leukocytes and control cultures decreased during the first several days. The dose-response colony formation data suggest that EBV transformation occurs in a one-hit response.

0208 SUPERINFECTION OF EPITHELIAL NASOPHARYNGEAL CARCINOMA CELLS WITH EPSTEIN-BARR VIRUS. (Eng.) Glaser, R. (Pennsylvania State Univ., Coll. Medicine, Hershey, PA 17033); de The, G.; Lenoir, G.; Ho, J. H. C. *Proc Nat Acad Sci USA* 73(3): 960-963; 1976.

Attempts were made to superinfect epithelial explant cell cultures prepared from nasopharyngeal carcinomas with Epstein-Barr virus. Virus-specific markers were observed in such cultures three days after superinfection. In addition, expression of Epstein-Barr virus early antigens was observed in epithelial cell explant cultures treated with iododeoxyuridine (60 μg/ml). The results suggest that epithelial cells of certain nasopharyngeal carcinomas possess the receptor for the Epstein-Barr virus, and that the latent virus genome can be induced from epithelial cells prepared from such tumors.

0209 DNA SYNTHESIS IN NUCLEI ISOLATED FROM CULTURED LYMPHOBLASTOID CELLS. (Eng.) Benz, W. C.; Strominger, J. L. In: *Oncogenesis and Herpesviruses II. Part 1: Biochemistry of Viral Replication and In Vitro Transformation. Proceedings of a Symposium Held in Nuremberg, Federal Republic of Germany, 14-16 October 1974.* International Agency for Research on Cancer, Lyon, France, IARC Scientific Publications No. 11, pt. 1, pp. 259-267; 1975.

Lymphocyte nuclei were prepared without mechanical disruption of the cells, and the active in vitro synthesizing systems in them were characterized, by a new modification of an established procedure. The cells were washed, agitated in 0.25% detergent, 0.25 M sucrose, and 0.0005 M N-2-hydroxyethylpiperazine-N'-2-ethanesulfonic acid. They were then washed without detergent, but with 2% Dextran type C 100, and tested for DNA synthesis with a DNA synthesis incorporation mixture containing ^{3}H-thymidine triphosphate. Nuclei taken from transformed cells in early logarithmic phase actively synthesized DNA for several hours. Nuclei from phytohemagglutinin-stimulated peripheral lymphocytes were less active, and those from unstimulated lymphocytes were inactive. Large DNA could be removed to distinguish Epstein-Barr viral from host DNA replication. P3HR-1 cell nuclei were allowed to synthesize DNA in vitro, and were washed lysed, sheared, and sedimented. DNA of density 1.718 g/cm^3 was synthesized at 35 and 95 min after breaking a double thymidine block. There was a shift toward lower densities at the later time.

0210 CELL-KILLING BY EPSTEIN-BARR VIRUS: ANALYSIS BY COLONY INHIBITION PROCEDURE. (Eng.) Sairenji, T. (Kunamoto Univ. Medical Sch., Kunamoto, 860, Japan); Katsui, T.; Hinuma, Y. *Int J Cancer* 17(3): 389-395; 1976.

The P3HR-1 and B95-8 strains of Epstein-Barr virus (EBV) were cytocidal for EBV-carrier human cell lines (Raji, NC-37, OAT, and P3HR-1), as revealed by a colony inhibition procedure. The cytocidal activity was proportional to virus dose added. The cell killing was neutralized by anti-EBV antibody-positive but not -negative human sera. When the relative sensitivity to UV light of EBV activities was examined, the cytocidal activity was much more resistant than the viral infectivity as assayed by early antigen-forming activity (P3HR-1 virus) or leukocyte-transforming activity (B95-8 virus), but it closely paralleled the ability to adsorb to cells.

0211 HEPATITIS B ANTIGEN IN LIVER CIRRHOSIS AND HEPATOCELLULAR CARCINOMA. (Eng.) Bartok, I. (Peterfy Hosp., Budapest, Hungary); Decastello, A. *Acta Hepatogastroenterol (Stuttg)* 22(6): 379-386; 1976.

Postmortem diagnosis of liver cirrhosis was made over a one-year period in 43 cases, 18 of which also exhibited hepatocellular carcinoma. Blood samples taken from these and 120 other patients who died from other diseases were tested for hepatitis-B antigen (HB-Ag) and its antibodies (HB-AB) by counter-electrophoresis. The types of cirrhosis found were classified on the basis of morphological characteristics and available etiological data. The greater part of controls had suffered from cardiovascular diseases and 32 had had nonhepatic carcinoma. Age limits were similar in the cirrhotic and control groups. HB-Ag was detected in 5 of the 25 subjects with macronodular cirrhosis and in one alcoholic patient among 18 subjects with other types of cirrhosis. The possibility of a coincidental HB virus infection existed in the alcoholic case and in one case of macronodular cirrhosis. Only one patient with liver carcinoma had HB-Ag. Among the 120 controls, HB-Ag and HB-AB were each found in one case. Microscopic lesions did not seem to be specifically related to the presence of HB-Ag in the cirrhotic livers.

0212 ACCUMULATION OF CYSTINE AUXOTROPHIC THYMOCYTES ACCOMPANYING TYPE C VIRAL LEUKEMOGENESIS IN THE MOUSE. (Eng.) Livingston, D. M. (Sidney Farber Cancer Center, Boston, MA 02115); Ferguson, C.; Gollogly, R.; Lazarus, H. *Cell* 7(1): 41-47; 1976.

hree NZB murine lymphoid cell lines obtained from
ZB mice free of hematopoietic neoplasm grow as
ell in cystine-deficient media containing L-cysta-
hionine (CSN), the immediate precursor of CYS in
he biosynthetic pathway, as in cystine sufficient
edium. The former class of cells was CYS auxotrophs
CYS-) and the latter, CYS prototrophs (CYS+).
ompared to CYS+ cells, the CYS- lines appeared
o be relatively deficient in the enzyme cysta-
hionase, which catalyzes the cleavage of CSN to
YS and α-ketobutyrate. According to the criterion
f protein synthetic capacity, normal thymocytes
rom mixed-bred Swiss mice behaved like CYS proto-
rophs, while those from littermates bearing
oloney type C virus-induced thymic tumors behaved
ike CYS auxotrophs. The former were also charac-
erized by substantially higher levels of cysta-
hionase than the latter. Extracts of thymocytes
om tumor-free AKR mouse thymus were also charac-
erized by higher levels of cystathionase activity
han extracts of spontaneous AKR thymomas. Exo-
enous in vitro type C virus infection of a CYS+
ll resulted in vigorous virus production but no
ncomitant reduction in cystathionase activity.
us viral replication alone in any random lymphoid
ll was not sufficient to alter the enzyme level.
e data suggest that CYS auxotrophy may closely
company neoplastic transformation of certain
matopoietic cells in vivo, including that induced
certain ''thymic'' type C viruses.

13 BRIEF COMMUNICATION: TYPICAL TYPE-C
VIRUS IN HUMAN LEUKEMIA. (Eng.) Hall, W.
(Electro-Nucleonics Lab, Inc., 4809 Auburn Ave.,
thesda, MD 20014) Schidlovsky, G. *J Natl Cancer*
st 56(3): 639-642; 1976.

e virus HL-23, isolated from a 61-yr-old woman
th myelogenous leukemia, was compared by electron
croscopy with virus-like particles observed in
man tissues and with several mammalian type-C
rus particles. It closely resembled the typical
pe-C virus particles of murine, feline, and
human primate species, and differed from all
rticles previously reported in human tissues,
cluding the atypical human placental particle.

14 INTRACISTERNAL A PARTICLES IN TRANS-
PLANTABLE RETICULUM CELL SARCOMA OF
TS. (Eng.) Mori, H. (Gifu Univ. Sch. Medicine,
Tsukasa-machi, Gifu 500, Japan); Kato, K.;
imaru, Y.; Hirono, I. *Gann* 66(6): 693-695; 1975.

ree lines of reticulum cell sarcomas (73-536,
-321, and 74-466), induced spontaneously in the
ph nodes of inbred ACI rats and transplanted sc
ip, were examined ultrastructurally for the
sence of intracisternal A particles. Spherical
ticles with two concentric shells, with an
ctron-lucent center, were detected in all three
comas. The doughnut-shaped particles measured
70 nm and were seen to bud from the membranes
rough-surfaced endoplasmic reticulum. The tumor
ls in lines 73-536 and 74-466 contained about 5-
and 3-11 particles in each cross-sectional cell
profile, respectively, while the 74-321 contained very few particles.

0215 THE SPECTRUM OF VIRUS RESISTANCE OF A KB CELL STRAIN RESISTANT TO DIPHTHERIA TOXIN. (Eng.) Moehring, J. M. (Univ. Vermont Sch. Medicine, Burlington, VT 05401); Moehring, T. J. *Virology* 69(2): 786-788; 1976.

A survey of viral susceptibility of diphtheria toxin-resistant KB-R strains of human epidermoid carcinoma was made to determine whether or not the viral resistance of such strains is limited to vesicular stomatitis virus, poliovirus, Newcastle disease virus, and the Mengo strain of encephalomyocarditis virus. The cells were restrictive to Sindbis virus, intermediate to rhinovirus (2), influenza, parainfluenza, respiratory syncytial virus, and Herpes simplex (type 2), and permissive to adenovirus (type 5) and rhinovirus (type 1A).

0216 MECHANISM OF INHIBITION OF RNA TUMOR VIRUS REVERSE TRANSCRIPTASE BY RIFAMYCIN SV DERIVATIVES. (Eng.) Gurgo, C.; Grandgenett, D.; Girard, G.; Green, M. In: *Tumor Virus-Host Cell Interaction. NATO Advanced Study Institutes Series: Series A, Life Sciences*, vol. 5. Edited by Kolber, A. New York, Plenum Press, 1975, pp. 273-291.

The rifamycin SV derivatives AF/ABDMP (2,5-dimethyl-4N-benzyl demethyl rifampicin), AF/013 (O-n-octyloxime of 3-formyl rifamycin SV) and C-27 [3-(dicyclohexyl-alkyl piperidyl)-rifamycin SV] were tested against a variety of purified enzymes, including the alpha and alpha-beta forms of the reverse transcriptase purified from avian myeloblastosis virus (AMV). These derivatives appear to be specific for nucleic acid polymerizing enzymes; they were found inactive when tested against non-polymerizing enzymes such as alkaline phosphatase, glutamate-oxaloacetate transaminase, RNase A, and DNase I, even at very high ratios of drug to enzyme molecule. The derivatives were very active against the DNA polymerase and RNase H activities of AMV. The mechanism by which the derivative AF/ABDMP inhibits the reverse transcriptase activities of AMV and murine leukemia-sarcoma virus, Moloney strain [MSV-MLV(M)] was studied. The drug interacted with the enzyme, not with templates, and the inhibition is completely reversible. Lineweaver-Burk analysis demonstrated that the inhibition is of the noncompetitive type with regard to the binding of templates and triphosphates. Inhibition occurred at an early step(s) of transcription, and was the result of the cooperative binding of drug molecules to a region distinct from the active site. The kinetic data of polymerization obtained with the two different forms of the AMV enzyme, alpha and alpha-beta, were analyzed in order to calculate the number of drug molecules that bind and inhibit the viral enzyme. A straight line with a slope of 6.5 was obtained with the alpha enzyme, which has one subunit. A biphasic plot was obtained with the alpha-beta enzyme, which has two subunits. The values obtained for the two slopes were 3 and 7, with the change in slope occurring at a drug concentration that gave approximately 65% inhibition. A slope of 1 was obtained when the inhibition of *Escherichia coli* RNA polymerase by AF/ABDMP was studied in an analogous way. The evidence suggests that the drug binds to a hydrophobic site on the enzyme that exerts a regulatory function on the initiation of DNA synthesis.

0217 AVIAN LEUKOSIS-SARCOMA VIRUS GENE EXPRESSION. NONCOORDINATE CONTROL OF GROUP-SPECIFIC ANTIGENS IN VIRUS-NEGATIVE AVIAN CELLS. (Eng.) Smith, E. J. (U.S. Dept. Agriculture, Regional Poultry Res. Lab., 3606 East Mount Hope Rd., East Lansing, MI 48823); Stephenson, J. R.; Crittenden, L. B.; Aaronson, S. A. *Virology* 70(2): 493-501; 1976.

0218 PRODUCTION OF LARGE QUANTITIES OF ^{32}P-LABELED RNA TUMOR VIRUS NUCLEIC ACID. (Eng.) Smith, R. E. (Duke Univ. Medical Center, Durham, NC 27710); Quade, K. *Anal Biochem* 70(2): 354-358; 1976.

0219 STUDIES ON FeSV INDUCED SARCOMATA IN SHEEP WITH PARTICULAR REFERENCE TO THE REGIONAL LYMPHATIC SYSTEM. (Eng.) Hall, J. G. (Chester Beatty Res. Inst., Clifton Ave., Downs Road, Sutton, Surrey, England); Scollay, R. G.; Birbeck, M. S. C.; Theilen, G. H. *Br J Cancer* 32(6): 639-659; 1975.

0220 THE ABSENCE OF ONE CLASS OF VIRUS-INDUCED PROTEIN IN ARGININE-DEPRIVED CELLS INFECTED WITH PIG HERPESVIRUS. (Eng.) Chantler, J. K. (Dept. Medical Microbiology, Univ. British Columbia, Vancouver, B.C. V6T 1W5, Canada); Stevely, W. S. *Virology* 70(1): 88-96; 1976.

0221 EQUINE HERPESVIRUS TYPE 1 IN VIVO: CHARACTERIZATION OF A DNA DENSITY VARIANT. (Eng.) Campbell, D. E. (Univ. Mississippi Medical Center, Jackson, Miss.). *Diss Abstr Int B* 36(8): 3774-B; 1976.

0222 THE REPLICATION OF RODENT PARVOVIRUS X14. (Eng.) Mayor, H. D. (Baylor Coll. Medicine, Houston, TX 77025); Jordan, L. E. *J Gen Virol* 30(3): 337-346; 1976.

0223 ULTRASTRUCTURAL STUDIES ON THE MORPHOGENESIS OF THE DENSONUCLEOSIS VIRUS (PARVOVIRUS). (Eng.) Garzon, S. (Faculte de Medecine, Universite de Montreal, Montreal, P.Q., Canada); Kurstak, E. *Virology* 70(2): 517-531; 1976.

0224 IN VITRO GROWTH CHARACTERISTICS OF VIRALLY TRANSFORMED MURINE MYELOID CELLS. (Eng.) Nooter, K. (Radiobiological Inst. TNO, Lange Kleiweg 151, Rijswijk (ZH), The Netherlands); Bentvelzen, P. *Cancer Res* 36(4): 1246-1250; 1976.

0225 PHENOTYPIC MIXING BETWEEN N- AND B-TROPIC MURINE LEUKEMIA VIRUSES: INFECTIOUS PARTICLES WITH DUAL SENSITIVITY TO FV-1 RESTRICTION. (Eng.) Rein, A. (Litton Bionetics, Inc., 7300 Pearl St., Bethesda, MD 20014); Kashmiri, S. V. S.; Bassin, R. H.; Gerwin, B. I.; Duran-Troise, G. *Cell* 7(3): 373-379; 1976.

0226 PROPERTIES OF TWO DISTINCT CLASSES OF LEUKEMIA VIRUSES INDUCED FROM C3H MOUSE CELLS. (Eng.) Bikel, I. (Harvard Medical Sch., 35 Binney St., Boston, MA 02115). *Virology* 69(2): 793-797; 1976.

0227 RNA AND PROTEINS OF THE KIRSTEN SARCOMA-XENOTROPIC LEUKEMIA VIRUS COMPLEX PROPAGATED IN RAT AND DUCK CELLS. (Eng.) Galehouse, D. M. (Dept. Molecular Biology and Virus Lab., Univ. California, Berkeley, CA 94720); Duesberg, P. H. *Virology* 70(1): 97-104; 1976.

0228 PRELIMINARY EVIDENCE FOR NOVEL FUCOSE-CONTAINING LIPIDS IN NORMAL AND MURINE SARCOMA VIRUS-TRANSFORMED RAT CELLS. (Eng.) Skelly, J. (Baylor Coll. Medicine, Houston, TX 77025); Gacto, M.; Steiner, M. R.; Steiner, S. *Biochem Biophys Res Commun* 68(2): 442-449; 1976.

0229 POLYPEPTIDES OF THE MOUSE MAMMARY TUMOR VIRUS. II. IDENTIFICATION OF TWO MAJOR GLYCOPROTEINS WITH THE VIRAL STRUCTURE. (Eng.) Sarkar, N. H. (Memorial Sloan-Kettering Cancer Center, New York, NY 10021); Taraschi, N. E.; Pomenti, A. A.; Dion, A. S. *Virology* 69(2): 677-690; 1976.

0230 EXTRINSIC LABELING OF MuMTV WITH A GALACTOSE OXIDASE-TRITIATED BOROHYDRIDE METHOD. (Eng.) Sheffield, J. B. (Inst. for Medical Res., Copewood St., Camden, NJ 08103); Daly, T. M. *Virology* 70(1): 247-250; 1976.

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IMIAN VIRUS 40 BY TRANSFER OF FRACTIONATED CHROMO-
OMES FROM TRANSFORMED CELLS. (Eng.) Shani, M.
Weizmann Inst. Science, Rehovot, Israel); Aloni,
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233 SELECTIVE INDUCTION OF MURINE ONCORNAVIRUS GENE EXPRESSION IN SOMATIC CELL
YBRIDS BETWEEN MOUSE PERITONEAL MACROPHAGES AND
V-40-TRANSFORMED HUMAN CELLS. (Eng.) Strand, M.
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ugust, J. T.; Croce, C. M. *Virology* 70(2): 545-
49; 1976.

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ELED ANTIBODY FRAGMENTS. (Eng.) Tabuchi, K. (Univ.
olorado Medical Center, Denver, CO 80220); Lehman,
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35 HYBRIDIZATION MAPS OF EARLY AND LATE MESSENGER RNA SEQUENCES ON THE ADENOVIRUS
PE 2 GENOME. (Eng.) Pettersson, U. (Wallenberg
b., Uppsala Univ., Uppsala, Sweden); Tibbetts,
; Philipson, L. *J Mol Biol* 101(4): 479-501; 1976.

36 SYNTHESIS OF COMPLEMENTARY VIRAL TRANSCRIPTS EARLY IN PRODUCTIVE INFECTION
TH ADENOVIRUS 2. (Eng.) Zimmer, S. G. (Washing-
n Univ. Sch. Medicine, St. Louis, MO 63110);
skas, H. J. *Virology* 70(1): 118-126; 1976.

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OTEINS. (Eng.) Rosenwirth, B. (Inst. Virology,
logne, W. Germany); Anderson, C.; Levine, A. J.
rology 69(2): 617-625; 1976.

38 A UNIQUE PATTERN OF INTEGRATED VIRAL GENES IN HAMSTER CELLS TRANSFORMED BY
GHLY ONCOGENIC HUMAN ADENOVIRUS 12. (Eng.) Green,
R. (St. Louis Univ. Sch. Medicine, St. Louis,
63110); Chinnadurai, G.; Mackey, J. K.; Green,
Cell 7(3): 419-428; 1976.

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MONKEY CELLS TRANSFORMED BY AN ADENOVIRUS 7-
IAN VIRUS 40 HYBRID. (Eng.) Shiroki, K. (Inst.
ical Science, Univ. Tokyo, P.O. Takanawa, Tokyo,
, Japan); Shimojo, H.; Sekikawa, K.; Fujinaga,
Rabek, J.; Levine, A. J. *Virology* 69(2): 431-
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0240 ALTERATION OF ADENOVIRUS ANTIGENIC SITES AND INFECTIVITY BY PERIODATE OXIDATION. (Eng.) Dreesman, G. R. (Baylor Coll. Medicine, Houston, TX 77025); Suriano, J. R. *Virology* 69(2): 700-709; 1976.

0241 PARTIAL ELIMINATION OF LATENT EPSTEIN-BARR VIRUS GENOMES FROM VIRUS-PRODUCING CELLS BY CYCLOHEXAMIDE. (Eng.) Tanaka, A. (Dept. Microbiology, Rush-Presbyterian-St. Luke's and Univ. Illinois Medical Centers, Chicago, IL 60612); Nonoyama, M.; Hampar, B. *Virology* 70(1): 164-170; 1976.

0242 EXPRESSION OF EPSTEIN-BARR-VIRUS-ASSOCIATED MEMBRANE ANTIGEN IN RAJI CELLS SUPERINFECTED WITH TWO DIFFERENT VIRUS STRAINS. (Eng.) Dolken, G. (Dept. Tumor Biology, Karolinska Institutet, S-104 01 Stockholm 60, Sweden); Klein, G. *Virology* 70(1): 210-213; 1976.

0243 CELL CYCLE DEPENDENCE FOR ACTIVATION OF EPSTEIN BARR VIRUS BY INHIBITORS OF PROTEIN SYNTHESIS OR MEDIUM DEFICIENT IN ARGININE. (Eng.) Hampar, B. (Natl. Cancer Inst., Natl. Inst. Health, Bethesda, MD 20014); Lenoir, G.; Nonoyama, M.; Derge, J. G.; Chang, S.-Y. *Virology* 69(2): 660-668; 1976.

0244 THE ASSOCIATION OF THE INFECTING DNA OF HERPES SIMPLEX VIRUS WITH CELLULAR COMPONENTS. (Eng.) Rice, M. (Dept. Molecular Biology and Biochemistry, Univ. California, Irvine, CA 92664); Stringer, J.; Swanstrom, R.; Wagner, E. K. *Virology* 70(1): 185-189; 1976.

0245 DEOXYCYTIDINE KINASE ACTIVITY FROM RABBIT KIDNEY CELLS INFECTED WITH HERPES SIMPLEX VIRUS TYPE 1 OR 2 (39192). (Eng.) Ogino, T. (Hamamatsu Univ., Sch. Medicine, Hamamatsu, Shizuoka, Japan); Rapp, F. *Proc Soc Exp Biol Med* 151(2): 28[illegible]284; 1976.

0246 MUTANTS OF HERPES SIMPLEX VIRUS TYPES 1 AND 2 THAT ARE RESISTANT TO PHOSPHONOACETIC ACID INDUCE ALTERED DNA POLYMERASE ACTIVITIES IN INFECTED CELLS. (Eng.) Hay, J. (Inst. Virology, Univ. Glasgow, Glasgow G11 5JR, U. K.); Subak-Sharpe, J. H. *J Gen Virol* 31(1): 145-148; 1976.

0247 PLAQUE MORPHOLOGY OF HERPES SIMPLEX VIRUS IN VARIOUS CELLS UNDER LIQUID OVERLAY AS A MARKER FOR ITS TYPE DIFFERENTIATION. (Eng.) Shinkai, K. (Central Res. Lab., Sankyo Co., Ltd., Tokyo, Japan). *Jpn J Microbiol* 19(6): 459-462; 1975.

0248 PRESENCE OF A HERPES SIMPLEX VIRUS TYPE 1 GENOME FRAGMENT IN HSV-TRANSFORMED CELLS. (Eng.) Kraiselburd, E.; Weissbach, A. In: *Oncogenesis and Herpesviruses II. Part I: Biochemistry of Viral Replication and In Vitro Transformation. Proceedings of a Symposium held in Nuremburg, Federal Republic of Germany, 14-16 October 1974.* International Agency for Research on Cancer. (Lyon, France): IARC Scientific Publications No. 11, pp. 415-419; 1975.

0249 EFFECTS OF CYTOCHALASIN B ON HERPES SIMPLEX VIRUS TYPE 1 REPLICATION. (Eng.) Dix, R. D. (Baylor Coll. Medicine, Houston, TX 77030); Courtney, R. J. *Virology* 70(1): 127-135; 1976.

0250 HERPESVIRUS PROTEINS: DNA POLYMERASE AND PYRIMIDINE DEOXYNUCLEOSIDE KINASE ACTIVITIES IN TEMPERATURE-SENSITIVE MUTANTS OF HERPES SIMPLEX VIRUS TYPE 2. (Eng.) Hay, J. (Inst. Virology, Univ. Glasgow, Glasgow G11 5JR, U. K.); Moss, H.; Jamieson, A. T.; Timbury, M. C. *J Gen Virol* 31(1): 65-73; 1976.

0251 INTERFERENCE OF HERPES SIMPLEX VIRUS MULTIPLICATION BY AVIAN ONCORNAVIRUSES (Proceedings Abstract). (Eng.) Kucera, L. S. (Bowman Gray Sch. Medicine of Wake Forest Univ., Winston-Salem, N. C. 27103); Dodge, W. H. *IRCS Med Sci (Suppl)* 3(10): 24; 1975.

0252 PROTEINS OF HERPESVIRUS TYPE 2: 1. VIRION, NONVIRION, AND ANTIGENIC POLYPEPTIDES IN INFECTED CELLS. (Eng.) Strnad, B. C. (Johns Hopkins Univ. Sch. Medicine, Baltimore, MD 21205); Aurelian, L. *Virology* 69(2): 438-452; 1976.

0253 OBSERVATIONS ON THE PURIFICATION OF POLYOMA VIRUS: EFFECT OF CHYMOTRYPSIN. (Eng.) Colter, J. S. (Dept. Biochemistry, Univ. Alberta, Edmonton, Alberta, Canada T6G 2H7); Chlumecka, V.; Ralph, R. K. *Virology* 70(1): 136-143; 1976.

0254 POLYOMA VIRUS IN URINE IN APLASTIC ANAEMIA (Letter to Editor). (Eng.) Lecatsas, G. (Dept. Microbiology, Univ. Pretoria, Pretoria, Republic of South Africa); Schoub, B. D.; Prozesky, O. W.; Pretorius, F.; de Beer. F. C. *Lancet* 1(7953): 259-260; 1976.

0255 TOPOGRAPHY OF POLYOMA VIRUS MESSENGER RNA MOLECULES. (Eng.) Kamen, R. (Dept. Genetics, Weizmann Inst. Science, Rehovot, Israel); Shure, H. *Cell* 7(3): 361-371; 1976.

0256 TRANSFORMATION OF HAMSTER EMBRYO CELLS BY DEFECTIVE POLYOMA VIRUS DNA. (Eng.) Şalmi, A. (Dept. Virology, Univ. Turku, Turku, Finland); Seehafer, J.; Colter, J. S. *Virology* 70(1): 223-226; 1976.

See also:

* (Rev): 0011, 0012, 0013, 0014, 0025, 0027,
0028
* (Chem): 0063
* (Phys): 0129, 0136
* (Immun): 0257, 0258, 0266, 0272, 0276, 02
0299, 0306, 0310, 0323, 0333, 03
* (Path): 0369, 0371, 0372, 0410, 0441
* (Epid-Biom): 0496

257 EFFECT OF PROPHYLACTIC AND THERAPEUTIC
ADMINISTRATION OF BCG VACCINE ON GROWTH
F EXPERIMENTAL SARCOMAS. (Eng.) Simova, J. (Inst.
xperimental Biology and Genetics, Czechoslovak
cad. Sciences, Praha 6, Czechoslovakia); Bubenik,
. *Folia Biol (Praha)* 21(5): 329-333; 1975.

ne effect of prophylactic and therapeutic adminis-
ration of Bacillus Calmette-Guerin (BCG) vaccine
n growth of transplantable sarcomas induced by
urine sarcoma virus (MSV)-Harvey ($MSVT_1$) and 3-
ethylcholanthrene (MC 11 and MC 12) in C57BL/10Sn
ice was studied. Growth of $MSVT_1$ sarcomas was not
nhibited by oral or intratumoral BCG therapy. Nor
s prophylactic oral administration of BCG fol-
wed by therapeutic oral BCG treatment effective.
wever, intradermal administration of an adequate
se of BCG vaccine preceding the tumor transplanta-
on inhibited tumor growth. The low (0.05-0.2 mg)
ses of BCG induced resistance comparable to the
fect of subcutaneous immunization with tumor
lls, whereas the higher (0.5-1.0 mg) doses had
effect. Growth of MC11 and MC 12 tumors was not
fected by prophylactic intradermal BCG administra-
on. It was concluded that the success of pro-
ylactic BCG vaccination depends on several fac-
rs: the tumor burden in the host, the optimal
se of BCG, and the route of BCG administration.

58 IMMUNIZATION AGAINST FELINE CALICIVIRUS
INFECTION. (Eng.) Bittle, J. L. (Res.
v., Pitman-Moore, Inc., P.O. Box 344, Washington
ossing, NJ 08560); Rubic, W. J. *Am J Vet Res*
(3): 275-276; 1976.

ty-three cats were vaccinated (two doses, 27
l 30 days between doses) with the F-9 strain of
line calcivirus im. There was no abnormal res-
se in any of the cats to the virus injection
l no spread of the virus from 20 vaccinated cats
nonvaccinated cats held in contact during the
t six months. The vaccinated cats developed
um-neutralizing antibodies that increased fur-
r after the second vaccination. The level of
um neutralizing antibodies was related to the
ntity of vaccinal virus administered. Twenty-
ee cats vaccinated with the F-9 strain were
tected to a significant degree when exposed to
ulent calicivirus strain FPV-255.

9 IMMUNOELECTROPHORETIC ABNORMALITY IN
SERA FROM PATIENTS WITH DIFFERENT MALIG-
T DISEASES. (Eng.) Munzarova, M. (Municipal
. Health, Brno, Czechoslovakia); Kubicek, R.;
a, A. *Br J Cancer* 32(6): 737-740; 1975.

noelectrophoresis of the sera of 310 normal
rs, 130 breast cancer patients, 135 patients
different malignancies, 280 patients with
erent nonmalignant internal diseases, 20 women
he last weeks of pregnancy, 10 women on the
5th day post partum, and 12 serum samples from the placental end of the cord was carried out, followed by diffusion against monospecific, alpha heavy chain SwAHu IgA. An abnormal precipitin line in the alpha-2 globulin region apart from normal asymmetrical precipitation lines in the beta 1 and beta 2 regions was found in 25% of breast cancer patients, 15% of patients with other malignancies, 80% of women in the last weeks of pregnancy, and in all women after parturition. This line was not seen in the sera of 92 normal male donors, in 30 men with nonmalignant internal diseases, in 200 children with nonmalignant internal disease, or in cord sera. It was present in 11% of 18 normal female donors, and in 4% of 50 females with different malignant internal diseases. The authors suggest that this antigen may be present in undetectable amounts in all individuals and may become manifest only when its level is raised; its level increases in pregnancy, while in malignancies it may characterize a disturbance of immunological reactivity.

0260 IMMUNE MODULATION AND DISEASE PATTERNS IN POPULATION GROUPS. (Eng.) Dutz, W. (Medical Coll. Virginia, Richmond, VA 23298). *Med Hypotheses* 1(6): 197-203; 1975.

Disease prevalence among different socio-economic groups following early infantile modulation of cell-mediated immunity by infection and nutrition related stress was studied. Wealthy populations living under highly hygienic circumstances can develop their cell-mediated immunity to genetic expectation while their humoral system remains unstimulated. Primitive populations protect the infant's immune development by breast feeding and suffer from temporary cell-mediated immune deficiencies due to intercurrent infectious disease and famine. Intermediary populations harbor a small percentage of people whose cell-mediated immune system has been permanently damaged by infection in early childhood, leading to a high incidence of diseases linked to cell-mediated immune deficiency. The possible cocarcinogenesis of the cell-mediated immune deficiency following repeated gastroenteritis and persistent stimulation of B cells, leading to alpha heavy chain disease and primary intestinal lymphoma, or due to falciparum malaria in newborns and its impact on the Epstein-Barr virus genome in development of Burkitt's lymphoma, was suggested.

0261 IMMUNE FUNCTIONS CHARACTERISTIC OF SJL/J MICE AND THEIR ASSOCIATION WITH AGE AND SPONTANEOUS RETICULUM CELL SARCOMA. (Eng.) Owens, M. H. (Sch. Medicine, Univ. California at Los Angeles, Los Angeles, CA 90024); Bonavida, B. *Cancer Res* 36(3): 1077-1083; 1976.

Immune competence was studied in SJL/J mice in order to study the relationship of tumor progression and immune function. The ability to generate cell-mediated immunity and antibody response to allografts was not impaired in 2- to 12-mo-old mice, regardless of their tumor status. All animals were capable of generating in vivo cytotoxic effector T-cells and both IgG and IgM classes of cytotoxic antibody to a tumor allograft. In addition to being able to respond, older mice showed an unexpected hyperresponsiveness to alloantigens, which suggested that escape from feedback control might be a characteristic of SJL/J mice. Loss of immune regulation was further indicated by the failure to induce tolerance to human gamma-globulin in mice 4 months and older, while 3-wk-old SJL/J mice could be rendered unresponsive. Coincident with this apparent loss of regulation, circulating antibodies to synthetic double-stranded RNA, polyinosinic x polycytidylic acid, were first detected in unimmunized mice at 4 months of age, and titers remained elevated regardless of tumor status. It is suggested that tumor development as well as autoimmunity may result from an effective amplification of the immune response.

0262 HOST IMMUNE REJECTION OF TA3 ASCITES CARCINOMA CELLS FOLLOWING ADMINISTRATION OF A WATER SOLUBLE CARBODIIMIDE. (Eng.) Tenforde, T. S. (Lawrence Berkeley Lab., Building 74, Univ. Southern California, Berkeley, Calif. 94720); Fawwaz, R. A.; Grossman, R. A. *Experientia* 32(2): 231-232; 1976.

To test the chemotherapeutic value of 1-ethyl-3-(3'-dimethylaminopropyl) carbodiimide HCl (EDCI·HCl), immunocompetent and immunosuppressed LAF_1/J mice were given weekly ip injections of 10^5 TA3 adenocarcinoma ascites tumor cells. Immunosuppression was produced by a single 700 rad whole-body dose of ^{60}Co radiation (exposure dose rate 18 R/min) two days before tumor cell challenge. EDCI·HCl was given as a single 60 mg/kg ip dose on the fourth day after TA3 challenge. No weight loss or mortality was caused by this dose in either normal or TA3 tumor-bearing mice. A three-fold increase in mean survival time was seen in immunocompetent mice, as compared to control mice that received an injection of 0.9% NaCl solution. Complete tumor regression, with indefinite survival, occurred in 12% of the mice treated with EDCI·HCl. There was no significant increase in mean survival time (only 3-5 days) for immunosuppressed mice relative to the controls. TA3 tumor growth kinetics were studied in mice treated as described previously. In immunocompetent mice, tumors showed net growth (at a reduced rate) for six days after EDCI HCl injection, with regression for the next six days. After 12 days there was a two or three week period of slow tumor growth before death, except in mice who had complete regression. In irradiated mice tumor growth slowed for four days following EDCI·HCl treatment. Then tumor growth resumed at the same rate as in the controls. The mechanism of EDCI·HCl action could not be determined.

0263 INFLUENCE OF POLYUNSATURATED FATTY ACIDS ON SURVIVAL OF SKIN ALLOGRAFTS AND TUMOR INCIDENCE IN MICE. (Eng.) Mertin, J. (Clinical Res. Center, Watford Rd., Harrow, HA1 3UJ, Middlesex, England); Hunt, R. *Proc Nat Acad Sci USA* 73(3): 928-931; 1976.

Preliminary studies of the effects of linoleic acid in mice were undertaken. The hypothesis that decreased polyunsaturated fatty acid serum levels should potentiate cell-mediated immune responses was tested by examining allograft survival in mice on polyunsaturated fatty acid-deficient diets. Survival of skin allografts from A strain (H-2 incompatible) and from C3H strain (H-2 compatible) mice in CBA mice was prolonged by sc or po administration of linoleic acid. Mice fed on a diet deficient in polyunsaturated fatty acids showed a relative immunopotentiation, as indicated by accelerated skin allograft rejection and decreased incidence and rate of development of methylcholanthrene-induced tumors. These observations support the hypothesis that polyunsaturated fatty acids take part in immunoregulatory mechanisms.

0264 INHIBITION OF ERYTHROID CELL GROWTH IN IRRADIATED MICE BY ALLOGENEIC LYMPHOID CELLS: SPECIFICITY OF THE RESPONSE. (Eng.) Lundegarde, G. (Dept. Tumor Biology, Karolinska Institutet, S-104 01 Stockholm, Sweden); Lilliehook, B.; Blomgren, H. *Cell Immunol* 22(2): 389-393; 197

Mouse lymphocytes were educated against allogenei cells, and their capacity to inhibit growth of relevant or irrelevant bone marrow cells injected into syngeneic or allogeneic hosts was tested. C57Bl, CBA, A/Sn, A/Sn x C57Bl (F_1), and CBA x C57Bl (F_1) mice were used. Growth of CBA x C57Bl, C57Bl, and CBA bone marrow cells was inhibited on transplantation to irradiated CBA x C57Bl recipients. Such educated cells were also able to inhibit growth of CBA x C57Bl but not CBA bone marrow cells in irradiated CBA hosts. The results indicate that the inhibition of erythroid cell proliferation in the spleens of irradiated allogeneic mice is due to a response against both the host animal and the specific bone marrow target cells.

0265 ENHANCEMENT OF A TUMOR ALLOGRAFT IN BALB/C X DBA/2 F_1 MICE BY PYRAN COPOLYMER. (Eng.) Mohr, S. J. (Viral Biology Branch, Natl. Cancer Inst., Bethesda, MD 20014); Chirigos M. A.; Fuhrman, F.; Smith, G. *Cancer Res* 36(4): 1315-1319; 1976.

The effect of pyran copolymer (NSC 46015) on the rejection of a murine leukemic allograft by BALB/ x DBA/2 F_1 mice was studied. Significant prolonga tion of allograft survival with production of progressively growing lethal tumors was found following ip pyran administration. This phenomeno occurred at nontoxic doses of the drug and appear

be closely related to the timing of pyran injec-
ion. Nonspecifically stimulated lymphocyte blast
ansformation by concanavalin A was not impaired
pyran when lymphocytes were exposed in vitro to
e drug. It is suggested that the mechanism of
mor allograft enhancement may be related to
lograft size at the time of pyran administration.

66 LACK OF ANTIGEN-ANTIBODY COMPLEX ASSO-
CIATED RENAL LESIONS IN AKR↔CBA/H-T6 Chim-
ras. (Eng.) Wills, E. J. (Clinical Res. Center,
tford Rd, Harrow, Middlesex HA1 3UJ, England);
rnes, R. D.; Tuffrey, M. *Clin Exp Immunol* 23(2):
9-394; 1976.

kidneys of 18 teraparental AKR↔CBA/H-T6
ise chimaeras derived by early embryo aggregation
re examined by light and electron microscopy for
tigen-antibody complex-associated glomerulonephro-
thy. Significant abnormalities comparable with
ose found in the parental AKR strain were seen
ly in two of those animals that had developed
nphomas. The results support the earlier conclu-
on from immunofluorescence microscopy and renal
ation studies that the lack of anti-Gross virus
ibody activity in the chimaeras is responsible
preventing or delaying the development of both
al and lymphomatous disease in these animals.

7 CLINICAL SIGNIFICANCE OF ANTIBODIES TO
OVARIAN ANTIGENS; ASSOCIATION WITH CANCER
THE GENITO-URINARY TRACT. (Eng.) Forbes, A. P.
rvard Medical Sch., Boston, MA 02115); Lake, J.
Bloch, K. J. *Clin Exp Immunol* 23(3): 436-443;
6.

a from 491 patients with cancer and from 151
ients of comparable age without recognized
cer were tested by indirect immunofluorescence
antibodies to ovarian antigens. Circulating
ibody to the cytoplasm of rabbit ova was found
from 19 to 47% of patients with cancer of the
ry, endometrium, kidney, bladder or testis, or
lymphoma, and in only 3.3% of control pa-
its. Antibodies to theca-cell antigens were not
common in patients with cancer than in other
ients, but within the group of cancer patients,
antibodies were, in all but one case, asso-
ted with cancer of the genito-urinary tract or
lymphoma. The anti-theca-cell antibodies
rved produced a staining pattern indistinguish-
from that obtained with the sera of patients
Addison's disease but were not, in the cancer
ents, associated with antibodies to adrenal
ue. Tests for antibody to the cytoplasm of ova
more frequently positive in patients with
ressive cancers than in patients successfully
ted by surgery or radiation, and were seen in
ents in whom cancer had recurred following
val of the organ of origin. These findings
est that the antigen or antigens that evoke
body to the cytoplasm of ova arise from tumor
s rather than from damage to normal tissue by
ery, tumor invasion or radiation.

0268 ANTIBODIES IN NORMAL RABBIT SERUM THAT REACT WITH TISSUE-SPECIFIC ANTIGENS ON THE PLASMA MEMBRANES OF HUMAN ADENOCARCINOMA CELLS. (Eng.) Tompkins, W. A. F. (Coll. Veterinary Medicine, Univ. Illinois, Urbana, IL 61801); Hager, J. C. *J Natl Cancer Inst* 56(2): 339-344; 1976.

Indirect viable cell immunofluorescence studies were performed on the plasma membrane of cultured adenocarcinoma cells from the human colon and rectum. A tissue-specific antigen reacted with a component of normal rabbit serum. The use of G200 column chromatography and monospecific antisera prepared against class-specific heavy chains of rabbit immunoglobulin identified the reactive components in rabbit serum as IgM. Examination of normal and malignant cells from various human tissues (HEI-407 embryonic intestine, HeLa cervical carcinoma, Hep-2 carcinoma of the larynx, KB epidermoid carcinoma of the mouth, AV-3 amnion cells, and HCF secondary cultures of colon fibroblasts) by immunofluorescence and adsorption studies showed that rabbit serum reacted only with cells derived from the intestinal epithelium. Knowledge of this tissue-specific antigen should prove useful in studies concerned with the antigenicity of human intestinal tumors.

0269 IMMUNOLOGICAL ENHANCEMENT OF SARCOMA I BY ANTIBODY TO FETAL ANTIGENS IN SYNGENEIC MICE. (Eng.) Goldberg, E. H. (Univ. New Mexico Sch. Medicine, Albuquerque, NM 87131); Tokuda, S. *Transplantation* 21(3): 263-265; 1976.

The effects of immunization with either allogeneic or syngeneic fetal cells on the A strain transplanted sarcoma I (SaI) growing in syngeneic A hosts was investigated. Strain A recipient mice were inoculated sc every 2 wk with 5×10^6 cells from either A or C57BL/Ks fetuses. Sixteen days after the sixth inoculation, these mice were inoculated sc with 10,000 SaI cells. Preimmunization with either fetal strain resulted in enhanced tumor growth and shortened survival time in comparison with control mice inoculated with spleen cells from adult A mice. SaI was then inoculated into mice receiving serum from mice that had been immunized with fetal cells. A single ip injection of 0.2 ml of undiluted serum from A or C57BL/Ks fetuses given 2 hr before sc inoculation of 10,000 SaI cells produced enhanced growth of SaI. The results indicate that antigens from both A and C57BL/Ks fetal cells are capable of eliciting, in the syngeneic host, antibodies that facilitate the growth of this tumor.

0270 HEPATOMAS IN GRS/A MALE MICE TREATED WITH HORSE SERUM OR HORSE ANTI-MOUSE ANTILYMPHOCYTE SERUM. (Eng.) Engelse, L. D. (Netherlands Cancer Inst., Amsterdam, Holland); Misdorp, W.; Emmelot, P. *Eur J Cancer* 12(2): 101-106; 1976.

Hepatic carcinogenesis in GRS/A male mice treated with normal horse serum (NHS) or horse anti-mouse antilymphocyte serum (HALS) was investigated.

Repeated (11-16) sc injections of HALS, NHS, or physiological saline (PS) were given to GRS/A male mice starting at the ages of ten days or eight weeks. All animals received two injections weekly. At the age of 49-58 wk all surviving animals were killed and autopsied. Hepatomas were found predominantly in groups started at the age of ten days. Highest hepatoma incidence was found in a group of animals treated from the age of ten days with 13 injections of 0.2 ml NHS (16 out of 29 animals surviving at two weeks after last injection; 55%). Small numbers of hepatomas were found in mice injected with either HALS or PS. No spontaneous hepatomas were detected in a control group of 53 untreated GRS/A male mice. None of the treatments resulted in significantly increased lung tumor incidences. Possible mechanisms of hepatoma formation in GRS/A male mice are discussed.

0271 TUMOUR-ASSOCIATED ANTIBODIES AGAINST RENAL CELL CARCINOMAS DETECTED BY IMMUNOFLUORESCENCE.

(Eng.) Ackermann, R. (Urologische Klinik und Poliklinik der Universitat Wurzburg, Josef-Schneider-Strasse 2, D-8700 Wurzburg, W. Germany). *Eur Urol* 1(3): 154-156; 1975.

Serum from 39 of 288 (13.5%) cancer patients contained antibodies detectable by immunofluorescence which reacted with frozen tumor sections from kidneys, prostate glands and ovaries. The serum did not react against areas of normal kidney taken from the same diseased organ. In comparison, 0.7% of normal persons and 3.8% of patients with nonmalignant diseases had antibody activity. Sections from two colon carcinomas did not react with the serum. It was concluded that tumor-associated antibodies do not necessarily have histological type specificity.

0272 SPECIFICITY OF HUMAN ANTIBODIES TO INTRACYTOPLASMIC TYPE-A PARTICLES OF THE MURINE MAMMARY TUMOR VIRUS.

(Eng.) Muller, M. (Medical Acad., ''Carl Gustav Carus,'' Schuberstrasses 15, 8053 Dresden, E. Germany); Zotter, S.; Kemmer, C. *J Natl Cancer Inst* 56(2): 295-303; 1976.

The specificity of the human antibody reaction to intracytoplasmic inclusions of mouse mammary tumors rich in intracytoplasmic type-A particles (iAp) was investigated. Large-scale studies showed that antibodies previously detectable in women with proliferating mastopathy or breast cancer were directed to iAp of mouse mammary tumor virus. Immunofluorescence revealed the human antibodies to be bound only by those tumors producing a certain amount of iAp clusters visible by light microscopy. The intensity of the reaction corresponded to the iAp content of every tumor tested as revealed by electron microscopy and rabbit antisera to iAp. The fluorescence patterns obtained with positive human sera were similar to those obtained with rabbit antisera specific for iAp and resembled the tissue distribution patterns of iAp inclusions stained by acid fuchsin. The reaction with human sera was entirely blocked by rabbit anitsera to iAp and, less so, by rabbit or mouse antisera to B particles. The human antibody activity was exhaustively absorbed by purified iAp or purified and disrupted B particles, indicating that the human antibodies were directed to antigenic components shared by iAp and B particles. Preliminary immunoperoxidase studies supported the assumption that hte human antibodies were bound to the iAp membrane; technical details might have accounted for the finding that human antibodies reacted with the iAp but not with B particles in situ.

0273 A NORMAL ADULT AND FETAL LUNG ANTIGEN PRESENT AT DIFFERENT QUANTITATIVE LEVELS IN DIFFERENT HISTOLOGIC TYPES OF HUMAN LUNG CANCER.

(Eng.) Bell, C. E., Jr. (Barnes Hosp., St. Louis, MO 63110). *Cancer* 37(2): 706-713; 1976.

Rabbits were immunized with extract of either an adenocarcinoma of the lung, or one of three oat cell carcinomas of the lung from autopsies of human patients. Unabsorbed and variously absorbed antisera, and various extracts, were analyzed by double and radial immunodiffusion. The adenocarcinoma-antisera identified an antigen subsequently quantitated at high concentration in seven adenocarcinomas of the lung, but at low concentration in five normal adult and four fetal lungs. Three of four epidermoid carcinomas of the lung contained the antigen at low concentration, but only trace amounts were detected in four of five oat cell carcinomas of the lung. The oat cell carcinoma-antisera failed to identify a significant antigen. Quantitatively, the above antigen appeared to distinguish adenocarcinomas and to a lesser extent epidermoid carcinomas from oat cell carcinomas of the lung, and to be consistent with the concept that oat cell carcinomas arise from a different cell type than the other lung tumors.

0274 DETECTION OF PRIVATE AND COMMON TUMOR-ASSOCIATED ANTIGENS IN MURINE SARCOMAS INDUCED BY DIFFERENT CHEMICAL CARCINOGENS.

(Eng.) Fritze, D. (D-69 Heidelberg, Medizinische Universitaets-Klinik, Bergheimerlandstr. 58, W. Germany); Kern, D. H.; Humme, J. A.; Drogemuller, C. R.; Pilch, Y. H. *Int J Cancer* 17(1): 138-147; 1976.

Two fibrosarcomas of similar histological type, induced in C3Hf mice by either methylcholanthrene or 3,4-benz(a)pyrene demonstrated individually unique tumor-rejection antigens in classical transplantation-type experiments. By contrast, sera of autochthonous mice, which resisted only transplants of the immunizing sarcoma, contained complement-dependent cytotoxic antibodies, specific for both sarcomas, in vitro. The existence of individually unique as well as common tumor-asso-

iated antigens in chemically-induced murine sar-
omas is suggested. The private ''tumor transplanta-
ion-type'' antigens elicited tumor rejection
esponses in vivo. The common tumor-associated
ntigens, although immunogenic in autochthonous
osts, inducing the production of tumor-specific
ntibodies, failed to induce transplantation cross-
esistance in vivo. This study supports the con-
ention that, in carcinogen-induced murine tumors,
nd perhaps in human neoplasms as well, the evalu-
tion of humoral (and cell-mediated) immune res-
onses in vitro may not reflect tumor rejection-
ype immune responses in vito.

275 ISOLATION AND CHARACTERIZATION OF TUMOUR-
SPECIFIC ANTIGEN FROM THE SERUM OF RATS
EARING TRANSPLANTED AMINOAZO DYE-INDUCED HEPA-
MAS. (Eng.) Bowen, J. G. (Cancer Res. Campaign
b., Univ. Nottingham, University Park, Nottingham
7 2RD, England); Baldwin, R. W. *Transplantation*
(3): 213-219; 1976.

mor-specific antigen was purified from the serum
animals bearing large progressively growing
ansplants of an aminoazo dye-induced hepatoma
23). Antigenic activity was detected by serum
utralization of antibody reactivity in hepatoma
mune serum for cell surface expressed antigen on
able hepatoma cells. Serum from animals bearing
rge ip grafts of tumor was fractionated by gel
ltration on Sephadex G-150 columns to yield a
ude antigen fraction which was further purified
affinity chromatography by using syngeneic rat
patoma D23 immune immunoglobulin G insolubilized
Sepharose 4B. The purified antigen exhibited a
of approximately 4.6 on analytical gel isoelec-
ic focusing. Molecular weight determination on
hadex G-200 at pH 7.3 in nondenaturing buffer
licated a primary molecular wt of 55,000 and a
ll amount of aggregated material (molecular wt
r 250,000).

76 ACCELERATED REGENERATION OF TRYPSIN-
TREATED SURFACE ANTIGENS OF SIMIAN VIRUS
-TRANSFORMED BALB/3T3 CELLS INDUCED BY X-IRRADI-
ON. (Eng.) Takeichi, N. (Viral Biology Branch,
l. Cancer Inst., Bethesda, MD 20014); Economou,
C.; Boone, C. W. *Cancer Res* 36(4): 1258-1262;
6.

immunological nature of the cellular immune
ponse against simian virus 40-transformed BALB
tumor cells inoculated in the footpad of syn-
eic or allogeneic BALB/c AnN mice was studied
a radioisotopic footpad assay. The antigens of
transformed cells regenerated in vitro 3 to 6
after removal by typsin treatment. After irradi-
on with 3000 R, however, the antigens were
enerated to normal levels within 1 hr. X-ray
es of between 1000 and 5000 R accelerated the
eneration of cell surface antigens, while x-
adiation with the larger dose of 8000 R did
. X-irradiation of nontrypsinized tumor cells
without effect.

0277 LACK OF DEMONSTRABLE H-2 ANTIGENS ON THE SURFACE OF TERATOCARCINOMA 402AX OF THE MOUSE MAINTAINED IN VIVO.

(Eng.) Isa, A. M. (Meharry Medical Coll., Nashville, TN 37208). *Transplantation* 21(3): 195-198; 1976.

Teratocarcinoma 402AX of strain 129/J (H-2b) mice was tested for major histocompatibility antigens. Absorption of serum D-33 (anti-H-2b) with tumor cells grown in AKR/J (H-2k) mice did not cause significant reduction in activity when the alloantiserum was tested on C57BL/6J (H-2b) spleen cells either by cytotoxicity or by immunofluorescence. Significant reduction in the cytotoxicity and immunofluorescence titers was observed when the same serum was absorbed with a tumor cell population grown in C57BL/6J (H-2b) mice. Similar findings were obtained with serum D-13 (anti-H-2d) and serum D-3b (anti-H-2k) following absorption with tumor cells from AKR/J or C57BL/6J mice. The data indicate that teratocarcinoma 402AX cells do not possess the major antigen(s) of the original donor strain 129/J (H-2b) or the present carrier strain AKR/J (H-2k).

0278 RESISTANCE OF ACTIVATED MACROPHAGES IN H-2 ANTIBODY-MEDIATED CYTOTOXICITY AND FC ROSETTE INHIBITION.

(Eng.) Kerbel, R. S. (Dept. Pathology, Queen's Univ., Kingston, Ontario, Canada). *Nature* 259(5540): 226-228; 1976.

Alterations in characteristics and functions of various macrophage receptors can apparently result from activation. A change involving Fc receptors (as detected by Fc rosette formation) and their relationship to surface mouse major histocompatibility antigens (as detected by anti-H-2 alloantisera) was investigated. Preincubation of DBA/2 (H-2d) mouse strain spleen cells with anti-H-2d alloantiserum resulted in a marked reduction of the ability of the cells to form Fc rosettes with IgG antibody-coated sheep RBCs (SRBCs) as compared with normal mouse serum (NMS)-treated controls. Preincubation with irrelevant anti-H-2 serum resulted in no inhibition. When normal peritoneal exudate cells containing an average of about 24% macrophages were similarly tested, drastic inhibition of the ability of the cells to form Fc rosettes was noted, showing that the Fc rosetting ability of most or all unstimulated macrophages is inhibited by the anti-H-2 pretreatment. Different results were obtained when peritoneal exudate cells from BCG- or proteose-peptone-injected mice were tested; these injections activated the macrophages, and the activated populations retained much of their Fc rosetting ability after anti-H-2 serum pretreatment. The activated macrophages seem to resist the inhibiting effects of the anti-H-2 serum. It is concluded that activated macrophages retain their Fc rosetting ability after anti-H-2 treatment, and suggested that the inhibition of Fc rosette formation may be a useful marker to detect activated macrophages.

0279 COLONY FORMATION IN VITRO BY LEUKAEMIC CELLS IN ACUTE MYELOGENOUS LEUKAEMIA WITH PHYTOHEMAGGLUTININ AS STIMULATING FACTOR.

(Eng.) Dicke, K. A. (M. D. Anderson Hosp. and Tumor Inst., 6723 Bertner, Houston, Texas 77025); Spitzer, G.; Ahearn, M. J. *Nature* 259(5539): 129-130; 1976.

A phytohemagglutinin (PHA) assay was used to test the growth of bone marrow cells from both untreated acute myelogenous leukemia (AML) patients and AML patients in relapse. Marrow from patients in remission and from normal individuals was also tested. First, 2 x 10^6 cells per ml of medium, 10% fetal calf serum and 10% human serum were cultured. PHA (0.05 ml) was added; after 15 hr the cells were washed and resuspended in agar medium. Then 1 x 10^5 cells were plated and 1 x 10^6 peripheral blood leukocytes from normal individuals were added. Simultaneously, 1 x 10^6 cells were plated without leukocytes. After 7 days of incubation at 37 C, colonies were counted. In vitro colony formation for the marrow from 14 untreated AML patients and from four AML relapse patients colonies was observed in the PHA assay system. The presence of leukocytes was not essential for colony formation by leukemic bone marrow, in contrast to previous results. Remission marrow and normal marrow showed an absolute dependence on the leukocyte factor for colony formation. Perhaps PHA stimulates a different cell subpopulation of the leukemic pool. The relationship between the number of cells plated and the number of colonies obtained, determined for one patient, was linear. Cell agglutination and aggregation by migration were both ruled out (there were only two cases of agglutination seen). PHA seems to stimulate leukemic cells to form colonies.

0280 STEROID SENSITIVITY OF THE PHA AND PWM RESPONSES OF FRACTIONATED HUMAN LYMPHOCYTES IN VITRO.

(Eng.) Blomgren, H. (Radiumhemmet, Karolinska Sjukhuset, Stockholm, S-104 01, Sweden); Andersson, B. *Exp Cell Res* 97(2): 233-240; 1976.

The in vitro phytohemagglutinin (PHA) and poke weed mitogen (PWM) responses of various fractions of human peripheral lymphocytes were tested for sensitivity to water-soluble prednisolone. Removal of cells having the capacity to phagocytize carbonyl iron particles, or having a tendency to adhere to plastics, increased the steroid sensitivity of both the PHA and PWM responses. T and B cell-rich preparations were obtained by passing cell suspensions, depleted of macrophages-monocytes as described above, through anti-Ig labeled bead columns, or by a rosette centrifugation technique. The mitogenic response of cell suspensions enriched for B cells was more steroid resistant than that of suspensions enriched for T cells. It was concluded that the blastogenesis of B cells in human lymphocyte cultures is more corticosteroid resistant than that of T cells.

0281 SUBVERSION OF HOST DEFENSE MECHANISMS BY MURINE TUMORS. II. COUNTER-INFLUENCE OF CONCOMITANT ANTITUMOR IMMUNITY.

(Eng.) North, R. J. (Trudeau Inst., Inc., Saranac Lake, NY 12983); Kirstein, D. P.; Tuttle, R. L. *J Exp Med* 143(3): 574-584; 1976.

In a related paper it was shown that injection of tumor cells resulted in rapid suppression of resistance to bacterial infection. Further experiments were designed to determine if this resistance persists during subsequent growth of the primary tumor. Semi-syngeneic mice were injected sc with 10^6 SA1, P-815 mastocytoma, or Meth A cells, and the capacity of the mice at progressive times thereafter to resist an iv 5 x 10^3 injection of *Listeria monocytogenes* cells was measured. The tumor cells caused an initial severely suppressed antibacterial resistance. However, the state of negative resistance waned rapidly after 24 hr, and was soon replaced by a contrasting state of greatly increased antibacterial resistance. Conversion from suppressed to enhanced resistance was shown to depend upon progressive growth of the primary tumor, and to correspond with conversion from suppressed to enhanced resistance to growth of a tumor cell challenge. The results show that changes in the level of antibacterial resistance reflect changes in the level of resistance to the tumor itself. This implies that antibacterial resistance and antitumor resistance are expressed by a common mechanism of defense.

0282 SPECIFIC ENHANCEMENT OF TUMOR GROWTH AND DEPRESSION OF CELL-MEDIATED IMMUNITY FOLLOWING SENSITIZATION TO SOLUBLE TUMOR ANTIGENS.

(Eng.) Rao, V. S. (Sch. Medicine, Univ. California at Los Angeles, Los Angeles, CA 90024); Bonavida, B. *Cancer Res.* 36(4): 1384-1391; 1976.

W/Fu rats sensitized with soluble tumor antigens from (C58NT)D lymphoma tumor cells prior to (C58NT)D tumor inoculation demonstrated a significant enhancement of tumor growth (the tumor reached up to 26 mm and was rejected by 16 to 18 days). Normally, such tumors reach 12-14 mm and are rejected by 10-12 days. The enhancement persisted in antigen-treated rats that continued to receive soluble antigen after tumor inoculation. The in vivo enhancement coincided with a significant in vivo depression of cell-mediated cytotoxicity (assessed with ^{51}Cr-labeled (C58NT)D target cells and peripheral blood leukocytes). The observed tumor enhancement was specific, inasmuch as presensitization to either soluble tumor antigens from WR6 (Gross virus-negative) tumor, syngeneic to W/Fu rats, or to soluble antigen from W/Fu spleen cells had no enhancing effect on (C58NT)D tumor growth. Sensitization to soluble tumor antigen alone did not elicit detectable cell-mediated immunity, cytotoxic antibody, or serum-blocking activity to the (C58NT)D tumor. It is concluded that sensitization to soluble tumor antigens specifically impairs the immune apparatus normally acting in tumor rejection. This impairment appears to act primarily at the induction phase of the immune response.

0283 ANTIBODY-DEPENDENT, CELL-MEDIATED CYTOTOXICITY WITH AUTOCHTHONOUS LYMPHOCYTES AND SERA AFTER INFECTION WITH MOLONEY SARCOMA VIRUS.

(Eng.) Lamon, E. W. (Univ. Alabama in Birmingham, Sch. Medicine, Birmingham, AL 35294); Hale, P.; Whitten, H. D. *J Natl Cancer Inst* 56(2): 349-355; 1976.

Antibody-dependent, cell-mediated cytotoxicity in the Moloney sarcoma virus (MSV) system was analyzed in terms of the ability of autochthonous antibody to induce or potentiate cytotoxicity by lymphocytes from adult BALB/c mice infected with MSV. The lymphocytes from regressor animals taken 30 days after virus infection were consistently more cytotoxic than those from tumor-bearing animals 15 days after infection. Antisera from the regressors potentiated the activity of regressor lymphocytes from the same animals. Also, antisera from tumor bearers, 15 days after virus injection, induced cytotoxicity by the animals' autochthonous lymphocytes which, by themselves, were not cytotoxic. In an independent assay for antibody, both groups of sera produced cytotoxicity by control nonimmune lymphocytes. Specificity controls indicated that both antibody and lymphocytes were required for the induction of cytotoxicity against the target cells in vitro. Normal sera placed on the target cells in the same concentrations induced no cytotoxicity by the immune lymphocytes, and immune sera alone placed on the target cells caused no cytotoxicity. The cooperative activity between antibody and lymphocytes may be a factor that accounts for the observed high incidence of spontaneous tumor regression.

0284 SPECIFICITY OF CELL-MEDIATED IMMUNITY IN MOUSE-HUMAN CROSS-REACTIONS: FORMAL DISCUSSION.

(Eng.) Parks, W. (Natl. Cancer Inst., Bethesda, MD 20014). *Cancer Res* 36(2): 559-869; 1976.

Viruses and immune responses to mouse breast cancer viral antigens are discussed. A substance, with a molecular weight of 52,000, which is related to the mouse mammary tumor virus glycoprotein has been reported to react with the lymphocytes of breast cancer patients. Other investigators concluded that there were several classes of binding reactions, and that the only types they observed with human sera were nonspecific. The need to adhere to criteria of specificity is emphasized. The best measures of specificity for an observed reaction in its relationship to viruses are those that involve purified viral polypeptides.

0285 KINETICS OF SERUM FACTORS MEDIATING BLOCKING, UNBLOCKING AND ANTIBODY-DEPENDENT CELLULAR CYTOTOXICITY IN HAMSTERS GIVEN ISOGRAFTS OF PARA-7 TUMOR CELLS.

(Eng.) Prather, S. O. (Pennsylvania State Univ., Coll. Medicine, Hershey, PA 17033); Lausch, R. N. *Int J Cancer* 17(3): 380-388; 1976.

Sera collected from inbred LSH hamsters and random-bred golden Syrian hamsters at intervals after PARA-7 tumor-cell inoculation were monitored for blocking, unblocking, and antibody-dependent cellular cytotoxicity (ADCC) using the microcytotoxicity test. Within seven days after isografting, significant levels of blocking were demonstrated. This activity increased in parallel with tumor growth and reached a maximum at day 21. In contrast, the capacity of the sera to mediate ADCC was maximal at day seven, and no longer detectable at three weeks. Unblocking was not demonstrable in tumor-bearer sera. Further studies showed that, when the tumor was excised, blocking activity fell rapidly while ADCC was elevated. Sera collected seven days after surgery could neutralize the blocking activity of tumor-bearer sera. Significant levels of unblocking were still evident ten weeks after surgery while ADCC had generally disappeared after five weeks. These findings illustrate the complexity of the hamster's humoral immune response to tumor cells, and suggest, first, that the sequestering of antibody by circulating tumor antigen accounts for the demise of ADCC in tumor-bearer sera and the concomitant appearance of blocking activity; and second, that the serum factors mediating ADCC and unblocking differ.

0286 T AND B CELLS AND CELL-MEDIATED IMMUNITY IN MYCOSIS FUNGOIDES.

(Eng.) Nordqvist, B. C. (Univ. Miami Sch. Medicine, P.O. Box 520875, Biscayne Annex, Miami, FL 33152); Kinney, J. P. *Cancer* 37(2): 714-718; 1976.

T and B cells in peripheral blood were evaluated in 13 patients with mycosis fungoides (MF) and in two patients with Sezary's syndrome. T cells were identified by their capacity to bind SRBC to their surfaces and the B cells were identified by the presence of surface immunoglobulins in immunofluorescence assay. Seven patients with MF and two with Sezary's syndrome had T-cell values below normal and elevated levels of null cells, i.e., cells with markers for neither T nor B cells. Low T-cell values and elevated null-cell values were found predominantly in patients with advanced MF (stages III-IV). Furthermore, these patients had impaired cell-mediated immunity, as shown by in vivo skin testing with recall antigens and attempts at sensitization to dinitrochlorobenzene.

0287 B AND T LYMPHOCYTES IN HODGKIN'S DISEASE: ANALYSIS AT DIAGNOSIS AND FOLLOWING THERAPY.

(Eng.) Gajl-Peczalska, K. J. (Dept. Lab. Medicine and Pathology, 446 Jackson Hall, Univ.

Minnesota, Minneapolis, MN 55455); Bloomfield, C. D.; Sosin, H.; Kersey, J. H. *Clin Exp Immunol* 23(1): 47-55; 1976.

B and T lymphocytes were studied in the blood and lymph nodes of 50 patients with Hodgkin's disease. At diagnosis, most patients (77%) had normal percentages of circulating B and T lymphocytes. Most patients (60%) also showed normal percentages of B and T lymphocytes in involved lymph nodes. Splenectomy had no effect on circulating B and T lymphocytes in four of five patients studied two weeks postoperatively. Seventeen patients were studied before and after treatment to determine the effect of therapy. Very high percentages of B lymphocytes were found in patients studied following radiotherapy. It appeared that the known defects in cell-mediated immunity in Hodgkin's disease are not expressed as significant abnormalities in B- or T-lymphocyte ratios in blood or lymphoid tissues at diagnosis. The proliferation of B lymphocytes following radiotherapy could represent a compensatory mechanism to cell-mediated deficiency or a loss of normal suppressor activity of T lymphocytes.

0288 HUMAN CORD BLOOD LYMPHOCYTES ULTRASTRUCTURAL AND IMMUNOLOGIC SURFACE MARKER CHARACTERISTICS; A COMPARISON WITH B- AND T-CELL LYMPHOMAS. (Eng.) Hamburg, A. (Univ. Chicago Hosp., Chicago, IL); Brynes, R. K.; Reese, C.; Golomb, H. M. *Lab Invest* 34(2): 207-215; 1976.

The ultrastructural and surface marker characteristics of human cord blood lymphocytes were studied and compared with those of cells of patients in the leukemic phase of malignant lymphoma (poorly differentiated lymphocytic type) and mycosis fungoides. Nuclear folding in cord blood lymphocytes was similar to that seen in lymphocytes of patients with both conditions. Surface marker characteristics of cord blood lymphocytes included increased percentages of surface immunoglobulin D on cells bearing surface immunoglobulins and decreased percentages of E-rosette-forming cells. The results support the hypothesis that both malignant lymphoma, poorly differentiated lymphocytic type and mycosis fungoides represent an arrest in the normal lymphocyte maturation sequence.

0289 HETEROGENEITY OF MOUSE B LYMPHOCYTES: STUDIES USING IN VITRO RESPONSE TO LIPOPOLYSACCHARIDE. (Eng.) Lamelin, J.-P. (International Agency for Res. Cancer, 150 Cours Albert-Thomas, 69008 Lyon, France); Vassalli, P. *Ann Immunol (Paris)* 126(5/6): 523-539; 1975.

When murine (Balb/c, C3H, [C57/Bl x C3H]F_1, ''nude'', and C3H/Ico) lymphoid cells from spleen and lymph nodes were cultured with Lipopolysaccharide (LPS), all the transformed blasts observed were B cells bearing surface IgM which could be classified into two types depending upon whether they contained intracellular IgM (iμ+) or not (iμ-). At the ultrastructural level, the two categories of blasts appeared to correspond to cells having a well-developed ER or primarily free ribosomes. A striking observation was that the proportion of iμ+ blasts among transformed cells was 5-10 times lower in cultures of lymph node than in cultures of spleen cells. The same observations were made on LPS cultures of ''purified'' B lymphocytes. Prolongation of the culture period did not modify these results. This indicated that the differences in the response to LPS reflected the existence of at least two pre-existing subpopulations of B cells unequally distributed in peripheral lymphoid organs. Analysis of the surface antigens and receptors (MBLA, surface Ig classes, Fc and C receptors) of the B cells from spleen and lymph nodes did show some differences between these two lymphoid organs. Among the transformed cells, Fc receptors were present mainly on iμ- cells and C receptors on iμ+ cells; however, no strict correlation could be made between the iμ+ or iμ- nature of these cells and their surface characteristics. The possibility that precursors of iμ+ and iμ- blasts might represent virgin and memory B cells or B cell populations differing in their requirement for helper factors released by stimulated T cells was explored by using cultures of spleen and lymph node cells obtained from germ-free mice, which are expected to have few memory cells, or performed in the presence of the supernatant of mixed lymphocyte cultures, in conditions where these supernatants are known to contain factors released by activated T cells. Neither condition modified the degree of transformation or Ig content of blasts.

0290 STIMULATION OF LYMPHOCYTES IN MIXED CULTURE BY CELLS FROM HL-A IDENTICAL SIBLINGS. (Eng.) Fefer, A. (Dept. Medicine, Univ. Washington, RG-20, Seattle, WA 98195); Mickelson, E.; Thomas, E. D. *Clin Exp Immunol* 23(2): 214-218; 1976.

The frequency with which peripheral blood leukocytes (PBL) from 91 patients with acute leukemia would stimulate non-reciprocally lymphocytes from their normal genotypically HL-A identical siblings was compared with that observed between cells of 82 pairs of normal HL-A identical siblings. The mean stimulation index (SI) between cells of normal sibling pairs was 1.06 ± 0.55, and significant stimulation, i.e. SI ≧ 2.16 was observed in only 7 out of 164 reactions. Similarly, PBL from only 2 out of 28 patients with leukemia in complete remission stimulated cells from 2 out of 44 siblings. By contrast, PBL from 17 out of 63 patients with leukemia in relapse stimulated cells from 21 out of 91 of their HL-A identical siblings. The results in marrow relapse were not significantly influenced by type of leukemia or by presence or absence of leukemic cells in the PBL. The results suggest that PBL from some patients with acute leukemia in relapse but not in remission possess antigens recognizable by lymphocytes from normal HL-A identical siblings, and that such antigens may be present on morphologically normal as well as leukemic cells.

0291 CYTOTOXIC EFFECTS OF SPLENIC ULTRAFILTRATES UPON LEUKAEMIC LYMPHOCYTES.

(Eng.) Attallah, A. M. (Res. Foundation Children's Hosp., Washington, DC 20009); Houck, J. C. *Br J Cancer* 32(6): 693-699; 1975.

Ultrafiltrates from calf spleen inhibited both DNA synthesis and the proliferation of normal lymphocytes stimulated in culture from both mouse and man without apparent cytotoxicity. However, the same doses of this ultrafiltrate killed up to two-thirds of the leukemic lymphoblasts from both species after 24 hr incubation. This unique lymphocytotoxic effect was also demonstrated on fresh primary cultures of leukemic lymphocytes and was highly effective on slowly growing established cell lines under crowd culture conditions. Furthermore, ultrafiltrated thymus extract did not affect the DNA synthesis rates or the viability of NC-37 lymphoblasts, which have B cell characteristics. Thymus extract was cytotoxic to Molt cells, which have T cell characteristics. The results indicate that the 30,000-50,000 dalton fraction of the spleen ultrafiltrates can inhibit the proliferative activity of mouse and human lymphoblastic cell lines.

0292 EFFECTS OF THYROXINE ON T CELL COUNTS AND TUMOUR CELL REJECTION IN MICE.

(Eng.) Aoki, N. (Kinki Univ. Sch. of Medicine, Sayma-cho, Minamika-wachi-gun, Osaka, Japan); Wakisaka, G.; Nagata, I. *Acta Endocrinol* 81(1): 104-109; 1976.

Inbred C3H/He mice (8-10-wk-old) were injected with thyroxine for more than three months, to study its effect on peripheral T cell counts or immunological functions. After treatment for three months the mice were examined for peripheral T-cell counts, thymic incorporation of ^{3}H-thymidine and rejection of tumor transplants. The number of T-cells was counted by the indirect immunofluorescence method using anti-θC3H serum. The peripheral counts of both lymphocytes and T-cells were increased in the thyroxine treated group as compared with the control group. Thymic incorporation of ^{3}H-thymidine was also significantly increased in the thyroxine treated group. In addition, to study T-cell activity of the host, thyroxine treated and control mice were challenged with Ehrlich carcinoma cells at several concentrations (10^2, 10^4 and 2 x 10^6/mouse). Rejection of tumor transplants was significantly enhanced in the T-cell rich mice. Thus, it is possible that thyroxine affects peripheral T-cell counts and enhances immunological functions of the host.

0293 APPARENT T CELL FUNCTION OF BONE MARROW CELLS FROM MICE EXPERIENCING A GRAFT-VERSUS-HOST REACTION.

(Eng.) Elie, R. (Departement de Sciences Biologiques, Universite de Quebec a Montreal, Montreal, Canada); Lapp, W. S. *Cell Immunol* 21(1): 185-191; 1976.

The graft-versus-host (GVH) reaction, induced in adult F_1 mice (strain B6 x A) by the injection of parental strain lymphoid cells (GVH mice), suppressed the in vitro plaque-forming cell (PFC) response to SRBC of spleen cells obtained from the GVH mice (GVH-SC); in vitro restoration of the PFC response of GVH-SC was performed with a modified Marbrook culture chamber consisting of an inner culture compartment (IC) separated from an outer culture compartment (OC) by a cell-impermeable membrane. Thymus cells (TC) and lymph node cells (LNC) but not bone marrow cells (BMC) from normal mice placed in the IC restored the PFC response of GVH-SC cultured with SRBC in the OC. The restoring ability of TC and LNC was markedly reduced following treatment with anti-theta serum plus complement. BMC taken from GVH mice three or more days post-GVH induction (GVH-BMC) and placed in the IC restored the PFC response of GVH-SC as well as TC and LNC. Treatment of GVH-BMC with anti-theta serum plus complement did not affect their restoring ability; furthermore, the number of theta-bearing cells in the bone marrow did not increase as a consequence of the GVH reaction. Two possible explanations were proposed for the T-like function of GVH-BMC: that the stress of the GVH reaction could increase the production of corticosteroid hormones and cause T cells to be sequestered in the bone marrow; or that the GVH reaction activates potential T cells in the bone marrow.

0294 HYPERACTIVE T-CELL FUNCTION IN YOUNG NZB MICE; INCREASED PROLIFERATIVE RESPONSES TO ALLOGENIC CELLS.

(Eng.) Palmer, D. W. (151-T Veterans Admin. Hosp., 4150 Clement St., San Francisco, CA 94121); Dauphinee, M. J.; Murphy, E.; Talal, N. *Clin Exp Immunol* 23(3): 578-581; 1976.

The one-way mixed lymphocyte reaction was used to study proliferative responses to antigens by mature, immunocompetent T cells from New Zealand Black (NZB) mice 3 wk to 4 mo old. The proliferative response of NZB (H-2d) lymphoid cells to mitomycin-blocked, allogeneic spleen cells was studied in experiments in which responding cells pooled from NZB mice were compared with responding cells pooled from age-, sex-, and H-2 type-matched control mice (C57BL/KsJ and DBA/2J). The incorporation of tritiated thymidine into DNA by allogeneic cultures was consistently greater for NZB mice than for control mice. This increased response was found in thymus, spleen, and lymph nodes of all NZB mice. The results are discussed in relation to possible effects of chronic stimulation by endogenous type C leukemia virus upon differentiation of functional T cells or upon regulation by T cells of other T cell functions, including augmentation of antibody responses.

0295 IN VITRO LYMPHOCYTE REACTIVITY AND T CELL LEVELS IN PATIENTS WITH MELANOMA: CORRELATIONS WITH CLINICAL AND PATHOLOGICAL STAGE. (Eng.) Silverman, N. A. (Natl. Cancer Inst., Natl. Inst. Health, Bethesda, MD 20014); Alexander, J. C., Jr.; Potevin, C.; Chretien, P. B. *Surgery* 79(3): 332-339; 1976.

In vitro lymphocyte reactivity (LR) to phytohemagglutinin (PHA) and peripheral blood thymus-dependent lymphocyte (T cell) levels were determined in 42 tumor-bearing patients with clinically operable melanoma and were compared to 41 age-matched normal controls. Patients with tumors clinically confined to the primary site (Stage I) as a group had normal immune reactivity and T cell levels, and those with regional metastases by clinical assessment (Stage II) had relatively impaired LR and T cell levels. In six of 24 patients with clinical Stage II tumors, widespread metastases (Stage III) subsequently were found. The severe immune defects in this group with occult disseminated melanoma accounted for the impaired LR and low T cell levels in the group with clinical Stage II tumors. Although overlapping levels of LR and T cells in the patients with pathological Stage II and III tumors prevent use of the data as a determinant of tumor extent in individual patients, the results show that these in vitro assays define a relation between cellular immunocompetence and tumor burden in patients with melanoma.

0296 T-CELL PRECURSORS IN MICE BEARING THE EHRLICH ASCITES TUMORS. (Eng.) Clerici, E. (Dept. Immunology, Univ. Milan, 20133 Milan, Italy); Bigi, G.; Garotta, G.; Porta, C.; Mocarelli, P. *J Natl Cancer Inst* 56(3): 513-516; 1976.

C57BL/6 mice bearing Ehrlich ascites tumors and challenged with SRBC produced fewer plaque-forming cells than did normal mice. At the same time that the immunosuppression developed, the number of T lymphocytes in the thymus and spleen was reduced significantly. In the spleen, the number of B lymphocytes remained constant during carcinogenesis, whereas that of the macrophages increased significantly, as compared to the controls. It was shown that the mechanism responsible for thymus and spleen depletion of theta antigen-bearing cells had to be ascribed to fewer T-lymphocyte precursors in the bone marrow of mice with cancer. The reduction of T-lymphocyte precursors was probably caused by the same ''soluble factor(s)'' produced by Ehrlich ascites tumor cells, which also interfered with the proliferation of myelopoietic stem cells in the bone marrow of mice with this neoplasm. By performing several reconstitution experiments of lethally x-irradiated hosts, it was determined that the immunodepression by Ehrlich ascites tumor cells was readily reversible, and the alteration of the T:B lymphocyte ratio in the spleen had a minor function, if any, in the pathogenesis of the immunosuppression.

0297 BRIEF COMMUNICATION: TISSUE SITES OF ALPHA FETOPROTEIN SYNTHESIS BY THE RAT DURING PREGNANCY AND HEPATOMA GROWTH. (Eng.) Sell, S. (Univ. California, San Diego Medical Sch., La Jolla, CA 92037); Skelly, H. *J Natl Cancer Inst* 56(3): 645-648; 1976.

The tissue sites of alpha$_1$ fetoprotein (AFP) synthesis in the BUF rat during gestation and hepatoma growth were studied by specific incorporation of a radiolabeled amino acid precursor into AFP by tissue cultures. During gestation, AFP were produced by the yolk sac, the fetal liver, and in small amounts by the fetal gastrointestinal tract; there was no synthesis by maternal rat tissues. During growth of a transplantable hepatoma, only the hepatoma tissue synthesized AFP; the nontumor tissue of the host contained AFP but did not produce it.

0298 SUBUNIT INTERACTIONS IN MOUSE MYELOMA PROTEINS WITH ANTI-GALACTAN ACTIVITY. (Eng.) Manjula, B. N. (Natl. Inst. Arthritis, Metabolism and Digestive Diseases, Natl. Inst. Health, Bethesda, MD 20014); Glaudemans, C. P. J.; Mushinski, E. B.; Potter, M. *Proc Nat Acad Sci USA* 73(3): 932-936; 1976.

The interactions among the subunits of a unique set of mouse myeloma proteins having specificity for β-D(1,6) galactans were studied by making homologous and heterologous recombinants of heavy and light chains. The recombinations were carried out by mixing together the desired heavy and light chains that had been separated on a Sephadex G-100 column in urea-acetic acid and renaturing the chains at near neutral pH. One homologous and six heterologous recombinants were prepared. All the recombinants prepared possessed a four-chain native-like structure. The ligand binding activity and idiotypic specificity of the homologous recombinant were essentially indistinguishable from those of the original native protein. All the heterologous heavy-light chain combinations also led to the regeneration of functional binding sites. The affinity of the heterologous recombinants toward various galactose ligands was comparable to those of the native molecules. Furthermore, the ligand binding affinity of the recombinants was almost invariably closer to the Ka of the original protein that had a higher affinity. Idiotypic specificity of the heterologous recombinants paralleled that of the original protein that had contributed the heavy chain.

0299 IGM ANTIBODY TO A TUMOR-ASSOCIATED ANTIGEN (AG-4) INDUCED BY HERPES SIMPLEX VIRUS TYPE 2: ITS USE IN LOCATION OF THE ANTIGEN IN INFECTED CELLS. (Eng.) Aurelian, L. (Johns Hopkins Univ. Sch. Medicine, Baltimore, MD 21205);

Smith, M. F.; Cornish, D. J. *J Natl Cancer Inst* 56(3): 471-477; 1976.

Rate-zonal centrifugation was used to separate 7S and 19S immunoglobulins (Ig) from sera of patients with cervical cancer and from that of controls. The Ig's were assayed for their ability to recognize AG-4, a tumor-associated antigen, and herpes simplex virus 2 (HSV-2), by neutralization, immunofluorescence, and complement fixation. The results indicated that antibody to AG-4 is a macroglobulin; antibody-fixing complement with HSV-2 is a 7S Ig. The results of the serologic assays did not show absolute correlation; some tests preferentially identified some antigen-antibody reactions. Evidence was obtained that AG-4 is in the cytoplasm and probably also on the cell surface.

0300 REITERATION FREQUENCY OF IMMUNOGLOBULIN LIGHT CHAIN GENES: FURTHER EVIDENCE FOR SOMATIC GENERATION OF ANTIBODY DIVERSITY. (Eng.) Tonegawa, S. (Basel Inst. Immunology, 487 Grenzacherstrasse, Postfach 4005 Basel 5, Switzerland). *Proc Natl Acad Sci USA* 73(1): 203-207; 1976.

Hybridization of both λ and κ mRNAs to excess mouse liver DNA yielded results compatible with gene reiteration frequencies of two to three. There was no evidence of hybridization of these highly purified mRNAs to reiterated DNA, and the kinetics of hybridization were very similar to those of purified globin mRNA. Purified λ mRNA from tumors producing structurally different λ chains were used in competition hybridization experiments. An unlabeled λ mRNA competed with another, labeled λ mRNA to the same extent as homologous unlabeled λ mRNA. That is, base sequence homology among λ mRNAs is so high that any λ mRNA should cross-hybridize with all germ line variable (Vλ) genes at least for those V-regions which are represented among myelomas. Amino-acid sequence data indicate that there are probably more than 25 different λ V regions. It is concluded that the number of germ line genes is too small to account for the diversity of λ chains and κ chains.

0301 IN VITRO SYNTHESIS OF IMMUNOGLOBULINS AND OTHER PROTEINS BY DYSPLASTIC AND NEOPLASTIC HUMAN MAMMARY TISSUES. (Eng.) Hurlimann, J. (Univ. Lausanne Medical Sch., 1011 Lausanne, Switzerland); Lichaa, M.; Ozzello, L. *Cancer Res* 36(4): 1284-1292; 1976.

The synthesis of several proteins in human mammary carcinomas and in dysplastic breast tissues was studied by tissue culture and by immunofluorescence. The synthesis of immunoglobulins showed marked quantitative and qualitative variations from one specimen to another, and a preferential synthesis of immunoglobulin G and C'3 in the carcinomas with lymphocytic infiltration. Fixation of immunoglobulins G and M on the surface of neoplastic cells was noted in some carcinomas. Secretory component was detectable in some cases by immunofluorescence, but no synthesis could be found in vitro, presumably because of unfavorable culture conditions. The synthesis of actoferrin, casein, and some serum α- and β-globulins was significantly greater in noncancerous tissues than in carcinomas. Synthesis of lactoferrin was also more frequent in the well differentiated carcinomas than in the poorly differentiated carcinomas. The tissue culture technique proved to be a useful tool for investigating the synthesis of several protein components by the epithelial cells of cancerous and dysplastic tissues of the human breast.

0302 SURFACE IMMUNOGLOBULINS AND RECEPTOR SITES FOR AGGREGATED IGG ON LEUKEMIC RETICULOENDOTHELIOSIS CELLS. (Eng.) Huber, C. (Medizinische Klinik der Universitat, A-6020 Innsbruck, Anichstrasse 35, Austria); Asamer, H.; Michlmayr, G.; Braunsteiner, H. *Blut* 32(1): 21-28; 1976.

The binding of ^{125}I-labeled immunoglobulin (Ig)G aggregates and of ^{125}I-labeled anti immunoglobulin sera was studied in the lymph nodes and spleen cells of four patients with leukemic reticuloendotheliosis (LR). The capacity to form spontaneous rosettes with SRBC to bind immune complement complexes and the proliferative response in the presence of phytohemagglutinin were also studied. On the surface of hairy cells a variety of immunoglobulins were demonstrable. IgG of both types was found to be the predominant surface bound immunoglobulin and evidence was obtained that these antibodies were adsorbed from the serum via Fc-receptors. In all LR-cases the percentages of T-cell rosettes as well as the phytohemagglutinin responses were decreased when compared with the normal controls. The numbers of immune complement complex binding cells were in the range of the normal controls.

0303 CORRELATION BETWEEN THE PRESENCE OF SURFACE LOCALIZED IMMUNOGLOBULIN (IG) AND THE HISTOLOGICAL TYPE OF HUMAN MALIGNANT LYMPHOMAS. (Eng.) Johansson, B. (Karolinska Hosp., S-104 01 Stockholm 60, Sweden); Klein, E.; Haglund, S. *Clin Immunol Immunopathol* 5(1): 119-132; 1976.

Biopsy material from 52 patients with malignant lymphoma (non-Hodgkin's lymphoma) were examined with immunofluorescence (IF) for presence of cell surface immunoglobulin (Ig). Brilliant membrane staining after exposure to anti-IgM serum was observed in 30 (58%) cases, was weak in 12 (23%), and had no reactivity in 10 (19%) cases. Intensive reactivity with uniform surface pattern was usually seen on the cells of well-differentiated lymphomas. Only in a few cases was intensive staining of moderately and poorly differentiated lymphocytes encountered. With some exceptions the amount of Ig was thus found to be related to the degree of cell differentiation. The poorly differentiated lymphomas usually carried low amounts of surface Ig in contrast to the findings reported in Burkitt's lymphoma, which are also poorly differentiated. Among 28 tumors with high concentration of surface IgM, 20 (72%) had a similar concentration of kappa chains. Unequivocal staining after reaction with anti-IgG reagent was seen only in one case (histiocytic lymphoma). Fixed material for examination of cytoplasmic Ig structures was available in 26 cases. None of these were found to exhibit significant intracellular staining with anti-IgM serum. In some moderately and poorly differentiated lymphocytic tumors, occasional IgG-containing cells were observed.

0304 MONOCLONAL LYMPHOID CELL SURFACE IMMUNOGLOBULINS WITH TUMOR-SPECIFIC DETERMINANTS IN LYMPHOSARCOMA.

(Eng.) Schedel, I. (Medizinische Hochschule Hannover, Hannover, W. Germany); Fink, P. C.; Bodenberger, M.; Deicher, H. *Clin Immunol Immunopathol* 5(1): 74-83; 1976.

Lymphoid cell surface membrane immunoglobulin (SmIg) from healthy donors and from six untreated patients with lymphosarcoma was demonstrated and characterized by using immunofluorescence techniques applying FITC-coupled anti-immunoglobulin antisera. The SmIg from lymphosarcoma patients was identified as predominantly of IgG. Lymphoid SmIg was isolated by a heat-elution technique. These were identified mainly as IgG. Anti-IgG activity of lymphosarcoma SmIg was demonstrated in such eluates by using different techniques. After immunization of rabbits with isolated individual lymphosarcoma SmIg, antisera were obtained which after absorption with lymphoid cells from healthy donors reacted only with the IgG fraction of lymphoid cell SmIg from the individual lymphosarcoma patient. Such idiotypic lymphosarcoma cell SmIg could be shown to be synthesized actively by lymphosarcoma cells in cell cultures. Since the SmIg of lymphosarcoma cells show unique individual antigenicity, they may be regarded as monoclonal Ig-bearing tumor-specific antigens.

0305 COMPARISON OF THE CIRCULAR DICHROISM SPECTRA OF THE SUBCLASSES OF HUMAN IMMUNOGLOBULIN A.

(Eng.) Riesen, W. F. (Basel Inst. for Immunology, Grenzacherstrasse 487, Postfach, 4005 Basel 5, Switzerland); Huser, H.; Skvaril, F. *FEBS Lett.* 61(2): 243-246; 1976.

The circular dichroism (CD) spectra of purified human IgA M-components belonging to the two known subclasses IgA$_1$ and IgA$_2$ were compared in an attempt to assess conformational differences between these two subclasses and to test the usefulness of this method for subclass typing of isolated IgA proteins. The IgA M-components were isolated from the sera of patients with multiple myeloma by Pevikon block electrophoresis, followed by Sephadex G-200 gel filtration. Two IgA$_1$K, two IgA$_2$K, two IgA$_1$L, and two IgA$_2$L M-components were studied. All IgA proteins showed essentially similar spectra in the wavelength region between 190 and 300 nm, characterized by a major negative transition around 217 nm, and by the absence of any positive transitions. Protein San, which belongs to the A$_2$m(1-,2+) variant of IgA$_2$, displayed a much smaller negative transition at 217 nm than any other immunoglobulin. This peculiarity might prove suitable for genetic typing of immunoglobulins belonging to the IgA$_2$ subclass.

0306 TUMOR-BOUND IMMUNOGLOBULINS: AN IN VIVO PHENOMENON OF MASKED SPECIFICITY.

(Eng.) Dorval, G. (Royal Victoria Hosp., 687 Pine Ave., West Montreal, H3A 1A1, Canada); Witz, I. P.; Klein, E.; Wigzell, H. *J Natl Cancer Inst* 56(3): 523-527; 1976.

The specificity of the immunoglobulin (Ig) "coating" on murine tumor cells grown in vivo was studied. Cells were treated in vivo for release of cell-bound Ig from ascites tumors. Such uncoated cells showed an increased expression of tumor-associated antigens and a parallel decrease in intensity of the Ig coat, by a complement-dependent cytotoxicity assay and radioimmunoassay, but displayed no changes in the expressions of other normal membrane antigens. These changes were attenuated if the tumor originated from animals that had been irradiated before tumor inoculation. No alterations were found with corresponding cells propagated in vitro and submitted to the same treatments. These findings and others suggest the presence of tumor-specific antibodies among the Ig coats detected on tumor cells grown in vivo.

0307 THE DIFFERENCES IN CARBOHYDRATE COMPOSITION BETWEEN THE SUBCLASSES OF IGA IMMUNOGLOBULINS.

(Eng.) Tomana, M. (Division of Clinical Immunology and Rheumatology, Univ. Alabama in Birmingham, Birmingham, AL 35294); Niedermeier, W.; Mestecky, J.; Skvaril, F. *Immunochemistry* 13(4): 325-328; 1976.

Statistical analyses of the carbohydrate compositions of 11 IgA1 and six IgA2 myeloma proteins were undertaken to investigate whether the observed differences in carbohydrate composition of the two known subclasses of IgA proteins are statistically significant. In addition to the known difference in the content of galactosamine, which is present only in proteins of IgA1 subclass, the study revealed further quantitative differences in the carbohydrate composition of both subclasses. IgA2 immunoglobulins were found to have significantly higher total carbohydrate content due to higher concentrations of fucose, mannose, and glucosamine. No differences between the subclasses were found in the content of galactose and sialic acid. Certain relationships between monosaccharides in proteins of individual subclasses were established: in IgA1 the sialic acid content was found to be inversely correlated with fucose; in IgA2 a positive correlation was observed between galactose and sialic acid.

0308 ANTIBODY DIFFERENTIATION: APPARENT SEQUENCE IDENTITY BETWEEN VARIABLE REGIONS SHARED BY IGA AND IGG IMMUNOGLOBULINS. (Eng.) Sledge, C. (Coll. Human Medicine, Michigan State Univ., East Lansing, MI 48824); Fair, D. S.; Black, B.; Krueger, R. G.; Hood, L. *Proc Natl Acad Sci USA* 73(3): 923-927; 1976.

A pair of human myeloma immunoglobulins (biclonal proteins) of the IgG and IgA classes from a single patient were analyzed. The light chains were identical in amino-acid sequence over 40 residues at their NH_2-terminus, whereas the heavy chains were identical throughout 45 residues of their NH_2-terminus. Additional chemical and serological studies suggested that the light chains and variable regions of the heavy chain (VH) are very similar, if not identical. The implications of these and of other published studies are discussed with regard to (a) the association of one VH region with multiple constant regions of the heavy chain (CH regions); (b) two alternative types of V-C joining mechanisms; (c) the differentiation of antibody-producing cells; and (d) three categories of biclonal immunoglobulins.

0309 PRELIMINARY REPORT OF AN IMMUNOLOGICAL STUDY IN UROLOGICAL CANCER. (Eng.) Serrallach, N. (Ciudad Sanitaria de la S. S. 'Principes de Espana' Hospitalet, Barcelona, Spain); Jiminez, J. F.; Aguilo, F.; Anguera, A.; Clavo, M.; Orejas, V.; Torner, V.; Serrate, R. *Eur Urol* 1(2): 99-100; 1975.

Two groups of patients with cancer of the genitourinary tract were compared: 24 were selected without regard to age, sex, general condition of the patient, the tumor's site, stage, or degree of malignancy, and eight were selected after surgery because there was no evidence of recurrence. Their cellular immune response was studied using tuberculin, candidina, epidermophytin and dinitrochlorobenzene. Blood samples were examined for unstimulated lymphocytes, tuberculin-stimulated lymphocytes, phytohemagglutinin-stimulated lymphocytes, rosette formation, and surface immunoglobulins. In all but one case (infiltrated ureteric papillary carcinoma), patients with a good immune response had a satisfactory course. Those whose pre-treatment immune response was good were treated with appropriate radical measures; those with poor immune response were treated less radically with periodic reevaluation to see if more radical procedures became indicated. It was suggested that the lymphocyte migration inhibition test is a very important factor to evaluate in such patients. Blocking factors in the serum may explain the poor results after surgery in those patients with poor immune response.

0310 SMOOTH-MUSCLE ANTIBODIES AND ANTIBODIES TO CYTOMEGALOVIRUS AND EPSTEIN-BARR VIRUS IN LEUKAEMIAS AND LYMPHOMATA. (Eng.) Andersen, P. (Inst. Medical Microbiology, Bartholin Building, Univ. Aarhus, DK-8000 Aarhus C, Denmark); Molgaard, J.; Andersen, I.; Andersen, H. K. *Acta Pathol Microbiol Scand Sect C* 84(2): 86-92; 1976.

0311 IMMUNE ASPECTS OF LYMPHORETICULAR MALIGNANCY (Proceedings Abstract). (Eng.) Hancock, B. W. (Dept. Medicine, Hematology, and Immunology, Sheffield, England); Bruce, L.; Sugden, P.; Ward, A. M.; Richmond, J. *Clin Sci Mol Med* 50(2): 5p-6p; 1976.

0312 DEMONSTRATION OF CELLULAR IMMUNITY IN CHRONIC MYELOID LEUKAEMIA USING LEUCOCYTE MIGRATION INHIBITION ASSAY. (Eng.) Gangal, S. G. (Tata Memorial Center, Parel, Bombay 400012, India); Gothoskar, B. P.; Joshi, C. S.; Advani, S. H. *Br J Cancer* 33(3): 267-272; 1976.

0313 TUMORICIDAL RESPONSES IN VITRO OF PERITONEAL MACROPHAGES FROM CONVENTIONALLY HOUSED AND GERM-FREE NUDE MICE. (Eng.) Meltzer, M. S. (Building 37, Rm. 2C20, Natl. Cancer Inst., NIH, Bethesda, MD 20014). *Cell Immunol* 22(1): 176-181; 1976.

0314 SPONTANEOUSLY ARISING NEOPLASM IN THE AKR MOUSE: A MODEL OF TUMOR IMMUNITY IN THE AUTOCHTHONOUS HOST. (Eng.) Levy, R. B. (Ohio State Univ., Columbus, OH 43210). *Diss Abstr Int B* 36(8): 3861-B; 1976.

0315 FACILITATION OF THE GROWTH OF AN ALLOGENEIC TUMOUR BY SUPPRESSOR CELLS IN NEWBORN RATS. (Eng.) Van Der Gaag, R. (John Curtin Sch. Medical Res., Australian Natl. Univ., P.O. Box 334, Canberra City, A.C.T., Australia 2601); McCullagh, P. *Aust J Exp Biol Med Sci* 53(5): 421-429; 1975.

0316 BINDING OF SECRETORY COMPONENT TO DIMERS OF IMMUNOGLOBULIN A IN VITRO: MECHANISM OF THE COVALENT BOND FORMATION. (Eng.) Lindh, E. (Institutionen for Medicinsk och Fysiologisk Kemi, Uppsala Universitetet, Box 575, S-751 23 Uppsala, Sweden); Bjork, I. *Eur J Biochem* 62(2): 263-270; 1976.

0317 PREPARATION OF FV FRAGMENT FROM THE MOUSE MYELOMA XRPC-25 IMMUNOGLOBULIN POSSESSING ANTI-DINITROPHENYL ACTIVITY. (Eng.) Sharaon, J. (Weizman Inst. Science, Rehovot, Israel); Givol, D. *Biochemistry* 15(7): 1591-1594; 1976.

0318 APPEARANCE OF CYTOLYTIC ANTIBODIES IN SHEEP LYMPH FOLLOWING IMMUNISATION WITH TUMOUR CELLS. IDENTIFICATION OF ANTIBODY SUB-CLASSES. (Eng.) Grant, C. K. (Sch. Veterinary Medicine, Univ. California, Davis, CA 95616); Adams, E. P.; Nass, M. *Aust J Exp Biol Med Sci* 53(5): 381-387; 1975.

0319 FB'$_2$, A NEW PEPTIC FRAGMENT OF HUMAN IMMUNOGLOBULIN G. (Eng.) Parr, D. M. (Dept. Biochemistry, Univ. Toronto, Toronto, Ontario M5S 1A8, Canada); Connell, G. E.; Kells, D. I. C.; Hofmann, T. *Biochem J* 155(1): 31-36; 1976.

0320 SPONTANEOUS SHEDDING AND ANTIBODY INDUCED MODULATION OF HISTOCOMPATIBILITY ANTIGENS ON MURINE LYMPHOMATA: CORRELATION WITH METASTATIC CAPACITY. (Eng.) Davey, G. C. (Chester Beatty Res. Inst., Belmont, Sutton, Surrey, England); Currie, G. A.; Alexander, P. *Br J Cancer* 33(1): 9-14; 1976.

0321 EXPRESSION OF TERATOMA-ASSOCIATED ANTIGENS ON MURINE OVA AND EARLY EMBRYOS: IDENTIFICATION OF TWO EARLY DIFFERENTIATION MARKERS. (Eng.) Gooding, L. R. (Box 3010, Duke Univ. Medical Center, Durham, NC 27710); Hsu, Y.-C.; Edidin, M. *Dev Biol* 49(2): 479-486; 1976.

0322 STUDIES ON CARCINO EMBRYONIC ANTIGEN (CEA): EFFECT OF CARBOHYDRATE AND SYNTHETIC GLYCOPEPTIDES ON CEA COMPETITIVE-INHIBITION RADIOIMMUNOASSAYS. (Eng.) Vrba, R. (Harvard Medical Sch., Boston, MA 02114); Alpert, E.; Isselbacher, K. J.; Jeanloz, R. W. *Immunochemistry* 13(3): 285-287; 1976.

0323 ANALYSIS AND DESCRIPTION OF PROCEDURES USED IN THE STUDY OF THE RELATIONSHIP OF HERPES SIMPLEX VIRUS ''NON-VIRION'' ANTIGENS TO CERTAIN CANCERS. (Eng.) Tarro, G. In: *Oncogenesis and Herpesviruses II. Part 2: Epidemiology, Host Response and Control. Proceedings of a Symposium held in Nuremberg, Federal Republic of Germany, 14-16 October 1974.* International Agency for Research on Cancer. (Lyon, France): IARC Scientific Publications No. 11, pp. 291-297; 1975.

0324 FACTOR VIII AND FACTOR-VIII-RELATED ANTIGEN IN MULTIPLE MYELOMATOSIS AND RELATED CONDITIONS. (Eng.) Gomperts, E. D. (Dept. Haematology, Univ. of the Witwatersrand, Johannesburg, South Africa); Shulman, G.; Lynch, S. R. *Br J Haematol* 32(2): 249-255; 1976.

0325 MONOCLONAL B-LYMPHOCYTES IN PERIPHERAL BLOOD OF PATIENTS WITH PLASMA CELL MYELOMA. RELATION TO ACTIVITY OF THE DISEASE. (Eng.) Mellstedt, H. (Seraphimer Hosp., Serafimerlasarettet, S-112 83 Stockholm, Sweden); Pettersson, D.; Holm, G. *Scand J Haematol* 16(2): 112-120; 1976.

0326 IMMUNE MATURATION OF T LYMPHOCYTES: SEQUENTIAL CHANGES IN THE FUNCTIONAL SPECIFICITY AND APPARENT AFFINITY OF HAPTEN-REACTIVE HELPER T CELLS DURING AN IMMUNE RESPONSE. (Eng.) Yamashita, U. (Natl. Inst. Health, Bethesda, MD 20014); Hamaoka, T.; Takami, T.; Kitagawa, M. *Cell Immunol* 22(1): 152-164; 1976.

0327 RADIOIMMUNOASSAY FOR HUMAN T-CELL ASSOCIATED ANTIGENS ON MOLT 4 CULTURED CELLS. (Eng.) Barcos, M. P. (Roswell Park Memorial Inst., 666 Elm St., Buffalo, NY 14263); Seon, B. K.; Minowada, J.; Pressman, D. *Immunol Commun* 4(6): 579-586; 1975.

0328 FATE OF H2-ACTIVATED T LYMPHOCYTES IN SYNGENEIC HOSTS I. FATE IN LYMPHOID TISSUES AND INTESTINES TRACED WITH ^{3}H-THYMIDINE, ^{125}I-DEOXYURIDINE AND ^{51}CHROMIUM. (Eng.) Sprent, J. (Dept. Zoology, Univ. Coll. London, London, England). *Cell Immunol* 21(2): 278-302; 1976.

0329 FATE OF H2-ACTIVATED T LYMPHOCYTES IN SYNGENEIC HOSTS. III. DIFFERENTIATION INTO LONG-LIVED RECIRCULATING MEMORY CELLS. (Eng.) Sprent, J. (Dept. Zoology, Univ. Coll. London, Gower St., WC1E 6BT, London, England); Miller, J. F. A. P. *Cell Immunol* 21(2): 314-326; 1976.

0330 MYCOSIS FUNGOIDES: MODEL FOR T-LYMPHOCYTE HOMING TO THE SKIN? (Eng.) Goos, M. (D-23 Kiel, Schittenhelmstrasse 7, W. Germany); Kaiserling, E.; Lennert, K. *Br J Dermatol* 94(2): 221-222; 1976.

0331 B AND T CELL NATURE OF LYMPHOID NEOPLASIA IN THE CANINE, FELINE, AND RHESUS MONKEY. (Eng.) Holmberg, D. V. M. (Univ. California, Davis, Calif.); Arthur, C. *Diss Abstr Int B* 36(8): 3877-3878-B; 1976.

0332 THE NATURE OF THE EFFECTOR CELL IN ANTIBODY-DEPENDENT, CELL-MEDIATED CYTOLYSIS (ADCC): THE CYTOTOXIC ACTIVITY OF MURINE TUMOR CELLS AND PERITONEAL MACROPHAGES. (Eng.) Handwerger, B. S. (Univ. Minnesota Sch. Medicine, Minneapolis, MN 55455); Koren, H. S. *Clin Immunol Immunopathol* 5(2): 272-281; 1976.

0333 PERCENT DISTRIBUTION OF T- AND B-LYMPHOID CELLS IN SPLEEN AND LYMPH NODES OF MOLONEY VIRUS INFECTED MICE. (Eng.) Mertens, H. (Pathology Inst., Univ. Cologne, Cologne, Lindenburg, W. Germany); Krueger, G. R. F. *Z Krebsforsch Klin Onkol* 85(2): 169-175; 1976.

0334 T AND B CELLS IN CEREBROSPINAL FLUID IN ACUTE LYMPHOCYTIC LEUKEMIAS (Letter to Editor). (Eng.) Astalidi, A. (Netherlands Red Cross Blood Transfusion Service, Amsterdam, Holland); Pasino, M.; Rosanda, C.; Massimo, L.; Gaslini, I. G. *N Engl J Med* 294(1): 550-551; 1976.

0335 STUDIES ON SURFACE IMMUNOGLOBULINS AND OTHER LYMPHOCYTE MEMBRANE MARKERS IN VARIOUS LYMPHOPROLIFERATIVE AND IMMUNODEFICIENCY DISEASES. (Eng.) Seligmann, M.; Preud Homme, J.-L.; Brouet, J.-C. In: *Advances in the Biosciences 12. Schering Symposium on Immunopathology Cavtat, Yugoslavia, May 28 to June 1, 1973.* International Committee of Immunopathology with the co-sponsorship of World Health Organization. (Pergamon Press, Vieweg, W. Germany): pp. 195-208; 1974.

0336 LYMPHOCYTOTOXICITY TO TUMOR TARGET CELLS AND INTERFERENCE, OF SERUM FACTORS OR TUMOR ANTIGEN WITH LYMPHOCYTOTOXICITY IN PATIENTS SUFFERING FROM DIFFERENT STAGES OF BREAST CARCINOMA. (Eng.) Warnatz, H. (Inst. u. Poliklinik f. klin. Immunologie, d. Univ. Erlangen-Nurnberg, D-8520 Erlangen, W. Germany); Lackner, D.; Eder, E.; Scheiffarth, F.; Gruhl, M.; Bischoff, O. *Z Krebsforsch Klin Onkol* 85(2): 181-194; 1976.

0337 CYTOTOXIC EFFECTOR CELL FUNCTION IN ORGANIZED GUT-ASSOCIATED LYMPHOID TISSUE (GALT). (Eng.) Nelson, D. L. (Building 10, Rm. 4N114, Natl. Inst. Health, Bethesda, MD 20014); Bundy, B. M.; Blaese, R. M.; Strober, W. *Cell Immunol* 22(1): 165-175; 1976.

0338 A COMPARATIVE STUDY ON IN VITRO CYTOTOXIC REACTIONS OF LYMPHOCYTES FROM NORMAL DONORS AND PATIENTS WITH SARCOMAS TO CULTURED TUMOR CELLS. (Eng.) Kay, H. D. (M. D. Anderson Hosp. and Tumor Inst., Houston, TX 77025); Thota, H.; Sinkovics, J. G. *Clin Immunol Immunopathol* 5(2): 218-234; 1976.

0339 THE EFFECTS OF PLASMA FROM GUINEA PIGS WITH TUMOR ON PHA STIMULATED LYMPHOCYTE CULTURES. (Eng.) Vandenbark, A. A. (Veterans Admin. Hosp., Portland, OR 97207); Burger, D. R.; Finke, P.; Vetto, R. M. *Cell Immunol* 22(2): 334-344; 1976.

0340 CELLULAR EVENTS IN TOLERANCE. V. DETECTION, ISOLATION AND FATE OF LYMPHOID CELLS WHICH BIND FLUORESCEINATED ANTIGEN IN VIVO. (Eng.) Scott, D. W. (Duke Univ. Medical Center, Durham, NC 27710). *Cell Immunol* 22(2): 311-322; 1976.

0341 SPECIFICITY OF IMMUNE LYMPHOCYTES FOR IN VITRO DETECTION OF VIRAL INDUCED TUMOR ASSOCIATED ANTIGEN(S). (Eng.) Harris, L. F. (Ohio State Univ., Columbus, OH 43210). *Diss Abstr Int B* 36(8): 3779-B; 1976.

0342 CHARACTERIZATION OF THE NORMAL LYMPHOCYTE POPULATION CYTOLYTIC TO BURKITT'S LYMPHOMA CELLS OF THE EB_1 CELL LINE. (Eng.) Matthews, N. (Welsh Natl. Sch. Medicine, Cardiff, Wales, UK); MacLaurin, B. P.; Clarke, G. N. *Aust J Exp Biol Med Sci* 53(5): 389-398; 1975.

0343 STUDIES ON SPECIFIC LYMPHOCYTE ACTIVITY IN BURKITT LYMPHOMA AND INFECTIOUS MONONUCLEOSIS. (Eng.) Svedmyr, E. A.; Deinhardt, F.; Golub, S. H.; Gunven, P.; Hoekstra, J.; Klein, G. In: *Advances in the Biosciences 12. Schering Symposium on Immunopathology, Cavtat, Yugoslavia, May 28 to June 1, 1973.* International Committee of Immunopathology with the co-sponsorship of World Health Organization. (Pergamon Press, Vieweg, W. Germany): pp. 511-522; 1974.

0344 INHIBITION OF THE MIXED LYMPHOCYTE CULTURE BY PERITONEAL EXUDATE CELLS. (Eng.) Fernbach, B. R. (Natl. Cancer Inst., Bethesda, MD 20014); Kirchner, H.; Herberman, R. B. *Cell Immunol* 22(2): 399-403; 1976.

See also:

* (Rev): 0013, 0014, 0015, 0016, 0017, 0026, 0028, 0029, 0030
* (Chem): 0038, 0062
* (Viral): 0150, 0160, 0172, 0177, 0180, 0194, 0201, 0202, 0203, 0205, 0206, 0211, 0219, 0234
* (Path): 0366, 0372, 0373, 0374, 0384, 0407, 0456

0345 OVARIAN AND PERIPHERAL VENOUS STEROIDS IN XY GONADAL DYSGENESIS AND GONADOBLASTOMA. (Eng.) McDonough, P. G. (Medical Coll. Georgia, Augusta, GA 30902); Ellegood, J. O.; Byrd, J. R.; Mahesh, V. B. *Obstet Gynecol* 47(3): 351-355; 1976.

Determinations of multiple steroids were made on ovarian and peripheral blood in a 46,XY patient with bilateral gonadoblastoma. The right gonadoblastoma had undergone complete calcific ablation. The principal viable cellular elements in the left gonadoblastoma were Leydig cells. Except for a borderline increase over peripheral levels of estradiol, the degenerated right tumor mass showed no evidence of endocrine activity. Venous blood emanating from the left cellular gonadoblastoma exhibited significant elevations of testosterone, progesterone, and estradiol as compared to peripheral blood. Viable sex cord elements were present in the left tumor mass but did not exhibit sufficient steroid activity to have demonstrable clinical manifestations.

0346 THE AGE OF OCCURRENCE OF GONADAL TUMORS IN INTERSEX PATIENTS WITH A Y CHROMOSOME. (Eng.) Manuel, M. (601 N. Broadway, Baltimore, MD 21205); Katayama, K. P.; Jones*, H. W., Jr. *Am J Obstet Gynecol* 124(3): 293-300; 1976.

The case reports of 320 intersex patients with a Y chromosome collected from the literature and from Johns Hopkins Hospital (98 cases) were analyzed to determine the expectancy of neoplasia in the gonads of these patients in relation to age. The patients were classifed into four groups: (1) gonadal dysgenesis, (2) asymmetrical gonadal differentiation, (3) virilizing male hermaphroditism, and (4) feminizing male hermaphroditism (testicular feminization syndrome). The incidence of tumors in relation to age and clinical classification was analyzed by computer. The results were plotted for each group. It was found that the percentage of tumors rose appreciably soon after the age of puberty in the first three groups, and the authors conclude that the gonads are best removed before the age of puberty. In the case of testicular feminization patients, procrastination until the age of 25 could be considered, if one were willing to assume the risk of neoplasia of about 3.6% until then.

0347 GONADOBLASTOMA IN A TRUE HERMAPHRODITE WITH A 46,XX KARYOTYPE. (Eng.) McDonough, P. G. (Medical Coll. Georgia, Augusta, GA 30902); Byrd, J. R.; Tho, P. T.; Otken, L. *Obstet Gynecol* 47(3): 355-358; 1976.

A 13-yr-old male with hypospadias, bilateral cryptorchidism, and breast swelling was found to have a urethral opening 0.5 cm anterior to the junction of the phallus and the labioscrotal pouches; the pouches were fused and bilaterally empty. The patient had a masculine body habitus with normal public and axillary hair. Cystoscopy gave no evidence of a separate vaginal orifice; the internal bladder contour was normal. A buccal smear revealed 32% single Barr bodies. A karyotype of the peripheral blood showed a 46,XX karyotype, as did a skin sample from the anterior forearm. Exploratory laparotomy revealed two soft cystic intra-abdominal gonads (2 x 1.3 x 1.5 cm), with a small uterus and two fallopian tubes present in the midline. Sections of the left gonad showed ovarian tissue with numerous primordial follicles. Some of the follicles were cystic and lined by luteinized theca cells. The rest of the left gonad consisted of seminiferous tubules with intervening Leydig cells. The ovarian and testicular elements were polar and separated by a demarcation line of fibrous tissue. Ovarian and testicular elements were also present in the right gonad. Just beneath the capsule of the right gonad were 10 sharply circumscribed cell aggregations. These aggregations were composed of larger cells surrounded and interspersed by smaller cells; this area was diagnosed as early cellular gonadoblastoma. The tumor was not grossly visible. Gonadoblastomas seem to develop almost exclusively in dysgenetic gonads, principally in individuals with and XY or XO/XY cytogenetic constitution. The common denominators apparently associated with this tumor are the presence of a Y chromosome, gonadal failure, and increased levels of pituitary gonadotropins. Undifferentiated cells within malformed gonads may evolve into a gonadoblastoma as in this case.

0348 CHARACTERISTIC CHROMOSOMAL ABNORMALITIES IN BIOPSIES AND LYMPHOID-CELL LINES FROM PATIENTS WITH BURKITT AND NON-BURKITT LYMPHOMAS. (Eng.) Zech, L. (Medical Nobel Inst., Karolinska Institutet, S-104 01 Stockholm, Sweden); Haglund, U.; Nilsson, K.; Klein, G. *Int J Cancer* 17(1): 47-56; 1976.

The karyotypes of cells from 10 Burkitt lymphoma (BL) biopsies, eight cell lines established from BL and nine cell lines from non-BL sources were studied by chromosome banding techniques. This study was undertaken to determine: (1) if the chromosome 14 marker is specific for BL tumors, (2) the cytogenic nature of the marker, (3) the relation between Epstein-Barr virus and the marker, and (4) if karyotypic analysis can aid in the classification of lymphoid lines derived from different hematopoietic neoplasia. With the exception of the BL-derived cell lines BJAB, GC-BJAB, Maku and U-8691, all biopsies and lines of Burkitt origin contained an extra band at the distal region of the long arm of one chromosome 14. An extra band on chromosome 14 was also found in cells of one non-BL biopsy, in cells from a lymphosarcoma-derived cell line and in a long-established cell line derived from the pleural exudate of a patient with Hodgkin's disease. A distal region at the long arm of one chromosome 8 was missing in all metaphase figures of good technical quality in the same material. The size, morphology, and stainability of the missing region corresponded fairly well to the extra region at chromosome 14. The authors suggest that the chromosome 14 marker represents a translocation between chromosomes 8 and 14,t (8q-; 14q+). The translocation was present neither in lymphocytes of the peripheral blood of five Burkitt patients nor in five lymphoblastoid cell lines of non-BL origin. Trisomy 7 was found in two of the 10 BL biopsies, in two BL-derived cell lines, in one non-BL biopsy, in two lymphosarcoma-derived cell lines and in one cell line derived from a patient with Hodgkin's disease.

0349 TRISOMY OF THE LONG ARM OF CHROMOSOME NO. 1 IN HUMAN LEUKEMIA. (Eng.) Oshimura, M. (Roswell Park Memorial Inst., 666 Elm St., Buffalo, NY 14203); Sonta, S.; Sandberg, A. A. *J Natl Cancer Inst* 56(1): 183-184; 1976.

A karyotypic abnormality was found in four patients with leukemia; the abnormality was a trisomy of part (or all) of the long arm of chromosome number one. Three of the leukemia patients had acute myeloblastic leukemia (AML) and one had chronic myelocytic leukemia (CML) in the blastic phase. Q- and G-banding techniques showed that in two patients with AML and in the one with CML, this karyotypic abnormality was not an initial one and was apparently associated with clinical progression of the disease. This chromosome change is a common karyotypic abnormality in blood disorders, especially in AML, and may bear a relationship to selective growth advantages of the leukemia cells.

0350 DISCORDANT PATTERNS OF CHROMOSOME CHANGES AND MYELOBLAST PROLIFERATION DURING THE TERMINAL PHASE OF CHRONIC MYELOID LEUKEMIA. (Eng.) Gall, J. A. (Univ. Pittsburgh Sch. Medicine, Pittsburgh, PA 15261); Boggs, D. R.; Chervenick, P. A.; Pan, S.; Fleming, R. B. *Blood* 47(3): 347-353; 1976.

A patient with Ph^1 positive chronic myeloid leukemia (CML) developed blastic transformation which by morphologic criteria appeared to be localized to the lymphatic system. Chromosome analysis at this time, however, revealed new chromosomal abnormalities in addition to the existing Ph^1 in all tissues studied (lymph node, blood, and bone marrow), consisting primarily of extra chromosome numbers 19 and 9 and a second Ph^1. Therapy [a three-day cycle of cytosine arabinoside (2 mg/kg), daunomycin (1 mg/kg), and vincristine (2 mg iv on day one only)] resulted in clinical remission with significant decrease in the aneuploid cell lines. However, these reappeared with recurrence of the blast crisis. Colony formation in semisolid culture of blood and marrow cells at the time of initial blast crisis yielded growth patterns characteristic of CML. On recurrence of the blast crisis after therapy, growth patterns were characteristic of CML in blast crisis or acute myeloblastic leukemia even though blood and marrow still showed relatively low levels of myeloblasts and promyelocytes.

0351 DIRECT IMPLANTATION OF PH^1 CHROMOSOME-POSITIVE MYELOBLASTS INTO NEWBORN HAMSTERS. (Eng.) Miyoshi, I. (Okayama Univ. Medical Sch., Okayama 700, Japan); Kubonishi, I.; Uchida, H.; Hiraki, S.; Toki, H.; Tanaka, T.; Masuji, H.; Hiraki, K. *Blood* 47(3): 355-361; 1976.

Peripheral leukocytes from a male patient with chronic myelogenous leukemia in blast crisis were implanted ip into seven newborn Syrian hamsters treated with antilymphocyte serum. At sacrifice 17-19 days after implantation, three hamsters had disseminated tumors. The other four hamsters were cannibalized. Chromosome analysis of cells from the enlarged lymph nodes revealed the presence of a human male karyotype. Most metaphase cells were pseudodiploid with the Ph^1 chromosome and isochromosome 17, while a few metaphase cells were classically diploid. Identical chromosome constitutions were observed in the original peripheral leukocytes of the patient. The results strongly suggested simultaneous heterotransplantation of Ph^1-positive leukemic and normal leukocytes.

0352 CHRONIC MYELOGENOUS LEUKEMIA PRESENTING IN THE BLASTIC PHASE AND ITS ASSOCIATION WITH A 45 XO PH^1 KARYOTYPE. (Eng.) Nigam, R. (Jewish Hosp. and Medical Center, 555 Prospect Place, Brooklyn, NY 11238); Dosik*, H. *Blood* 47(2): 223-227; 1976.

The case report of a 58-yr-old male patient in the blastic phase of chronic myelogenous leukemia (CML) and with a 45 XO Ph^1 karyotype is presented. Cytogenetic studies revealed the 45 XO Ph^1 chromosome pattern in bone marrow cells during a short remission and again in the blastic phase of the disease. The patient expired 8 mo following diagnosis. The blastic phase of CML can simulate acute myelogenous leukemia (AML) clinically and hematologically; CML can be differentiated by the presence of the Ph^1 chromosome and the stigmata of CML. Absence of the Y chromosome from the bone marrow in CML is a recently described finding. Previous reports indicating the prevention of the blastic phase in patients with this karyotype could not be confirmed by this or other recently reported cases.

0353 CHROMOSOMES AND CAUSATION OF HUMAN CANCER AND LEUKEMIA. (Eng.) Sakurai, M. (Roswell Park Memorial Inst., 666 Elm St., Buffalo, NY 14263); Sandberg*, A. A. *Cancer* 37(2): 790-804; 1976.

The cytogenic features of erythroleukemia (EL), particularly as related to the group of AML patients with MAKA (major karyotypic abnormalities), were studied. Eight of the 17 patients with MAKA had a diagnosis of EL or possible EL. In most cases, MAKA was featured by hypodiploidy, karyotypic instability, and polyploidy in the leukemic cells. The most common abnormalities were loss of B or G group chromosomes and gain of a number 16 or one or more marker chromosomes. Each of the markers of 2q+, Dq+, mar(A2, st), mar(C12, M), r(?F) and minute metacentric and acentric markers was observed in two or more patients. The extent of polyploidy apparently correlated with the proportion of erythroid precursor cells in the marrow and with the karyotypic instability. Since the patients exhibited the same chromosomal features, whether or not they had a diagnosis of EL or possible EL, and since patients without such a diagnosis also had cytologic suggestions of EL, a close relation of MAKA to EL is assumed. It is believed that patients with MAKA constitute one of the three chromosomally classifiable groups of EL.

0354 CHROMOSOMES AND CAUSATION OF HUMAN CANCER AND LEUKEMIA: XIV. ORIGIN OF A LARGE NUMBER OF MARKERS IN A CANCER. (Eng.) Kakati, S. (Roswell Park Memorial Inst., 666 Elm St., Buffalo, NY 14263); Hayata, I.; Sandberg, A. A. *Cancer* 37(2): 776-782; 1976.

A cancerous effusion from a 68-yr-old woman with cancer of the breast, with a high modal number of chromosomes (81-83) and with 11-13 abnormal chromosomes (markers) of eight different origins, was examined karyotypically with C-, G-, and Q-banding techniques. Except for a rare chromosome, all the normal chromosomes were identified and, more importantly, the origin of all markers was ascertained. This indicates the feasibility of identifying all the chromosomes in cancer cells, even in those with highly polyploid and complicated chromosome constitutions.

0355 SPECIFIC MARKER CHROMOSOMES INVOLVING A TRANSLOCATION (12; 15) IN A MOUSE MYELOMA. (Eng.) Yoshida, M. C. (Faculty Science, Hokkaido Univ., Sapporo, Japan); Moriwaki, K. *Proc Jpn Acad* 51(7): 588-592; 1975.

Banded karyotypes were analyzed in P-41 subline of a mouse myeloma MSPC-1 and its in vitro line. Both lines consistently showed a 41, X, -Y, +9, +13, t(12; 15) karyotype. This karyotype was fairly stable in both lines for a period of 4 mo, although prolonged in vitro passages led to changes of the karyotype and tumorigenicity. Two markers resulting from the translocation (12; 15) were considered to be specific for mouse myelomas, in conformity with previous findings.

0356 FAMILIAL DISTRIBUTION OF LYMPHOCYTOTOXINS IN HODGKIN'S DISEASE. (Eng.) Mendius, J. R. (Univ. New Mexico Sch. Medicine, Stanford and Lomas, Albuquerque, NM 87106); DeHoratius, R. J.; Messner, R. P.; Williams*, R. C., Jr. *Ann Intern Med* 84(2): 151-156; 1976.

The prevalence of lymphocytotoxic antibody was studied in 131 relatives of 10 patients with Hodgkin's disease to search for evidence of environmental or familial influence in this disease. The study group contained nine families, five of whom had two subjects with Hodgkin's disease. One hundred twenty-eight control family members were studied in parallel. Lymphocytotoxic antibody was present in 35.5% of all family members of patients with Hodgkin's disease, and in 8.6% of controls. Lymphocytotoxic antibody appeared primarily in consanguineous relatives irrespective of close personal household contact with the probands. The prevalence of the antibody was equal in both first- and second-degree relatives. These findings suggest at least a genetic and possibly an environmental influence in the genesis of lymphocytotoxic antibody among relatives of patients with Hodgkin's disease.

0357 FAMILIAL SJOGREN'S SYNDROME WITH ASSOCIATED PRIMARY SALIVARY GLAND LYMPHOMA. (Eng.) Lichtenfeld, J. L. (Univ. Maryland Hosp., 22 S. Greene St., Baltimore, MD 21201); Kirschner, R. H.; Wiernik, P. H. *Am J Med* 60(2): 286-292; 1976.

A rare case is described of a 50-yr-old woman with Sjogren's syndrome in whom a primary parotid gland lymphoma subsequently developed. In addition to the propositus, two of four siblings had definite evidence of Sjogren's syndrome and a third had several abnormal studies commonly associated with the disease. This observation suggests that genetic influence alone or in conjunction with other factors may facilitate the development of Sjogren's syndrome.

0358 THE INHERITANCE OF HYPERLIPOPROTEINAEMIA WITH XANTHOMATOSIS: A STUDY OF 132 KINDREDS. (Eng.) Heiberg, A. (Inst. Medical Genetics, P.O. Box 1036, Univ. Oslo, Blindern, Oslo 3, Norway); Berg, K. *Clin Genet* 9(2): 203-233; 1976.

In a study of xanthomatosis kindreds in the county of Ostfold, Norway, 95% of the living first degree relatives of the probands were investigated. Hyperlipoproteinemia (lipid values above the 95th percentile) was present in 40.8% of 554 first degree relatives of probands with xanthomatosis. The distribution curve was bimodal for cholesterol and low density lipoprotein cholesterol concentrations, but not for triglyceride concentration within the different categories of families. The IIA lipoprotein pattern was the most frequent lipoprotein abnormality, in probands and affected first degree relatives. However, IIB and IV lipoprotein patterns were also found in affected family members, irrespective of the pattern in the probands. About 93% of the xanthomatous subjects had a lipoprotein disorder segregating as an autosomal dominant; the remaining 7% were sporadic cases and/or had a multifactorially determined xanthomatosis. More siblings than offspring were affected; this was particularly pronounced for males with a IIA lipoprotein pattern. The genetic analysis gave no reason to suspect that hypercholesterolemia with a

IIA pattern is not the same disease as hypercholesterolemia with a IIB pattern. However, a significant number of xanthomatosis patients had more than one type of hyperlipoproteinemia. The frequency of the xanthomatosis trait was estimated to be 3.2/1,000, and the ascertainment probability 0.6. The prevalence of familial hypercholesterolemia with xanthomatosis was estimated to be 2.2/1,000 and the multiple type hyperlipoproteinemia with xanthomatosis had a frequency of 1.0/1,000.

0359 RETICULUM-CELL SARCOMA IN A FATHER AND HODGKIN'S DISEASE IN HIS SON (Letter to Editor).

(Eng.) Hanganu, E. (Clinica Radiologica, Str. Musatini 55 (R-2), 6600-Iassy, Rumania). *Lancet* 1(7959): 587; 1976.

A 30-yr-old man developed an undifferentiated reticulum-cell sarcoma. His son presented with the symptoms of Hodgkin's disease at the age of five years, a year after the onset of the father's malignancy. The case supports the idea of a genetic basis and possibly a common causal factor for some lymphatic malignancies. It is proposed that the father's malignancy against the genetically favorable background of the child was limited by a granulomatous reaction (Hodgkin's disease).

0360 FAMILIAL COLON CANCER.

(Eng.) Miller, M. S. (New England Medical Center, 171 Harrison Ave., Boston, MA 02111); Costanza, M. E.; Li, F. P.; Stolbach, L.; Stone, R.; Nathanson, L. *Cancer* 37(2): 946-948; 1976.

A study was made of a kindred with a strong history of carcinoma of the colon. Colon carcinoma had occurred in seven family members at relatively early ages (23-73 yr). Twenty-three of 36 family members were screened for the tumor with carcinoembryonic antigen (CEA) assay, barium enema, and proctoscopy; one occult colon cancer was diagnosed. Identification and surveillance of families at high risk of cancer can provide unusual opportunities for early tumor detection.

0361 LEYDIG CELL TUMOR IN IDENTICAL TWIN.

(Eng.) Turner, W. R. (Medical Univ. South Carolina, 800 Barre St., Charleston, SC 29401); Derrick, F. C.; Wohltmann, H. *Urology* 7(2): 194-197; 1976.

A 9-yr-old black male, an identical twin, underwent a sudden growth spurt that began 2 yr before treatment. This twin showed an adult habitus with well-developed musculature and adult genitalia; this was in sharp contrast to his twin's normal prepubertal growth. His voice had deepened; axillary, pubic, and extremity hair was mature. A right testicular mass was found. His estimated radiological age was 212 mo. The right testicle was removed; it demonstrated to be a dark, red lesion with areas of focal hemorrhage. Microscopic sections showed an interstitial cell tumor with atrophy of the seminiferous tubules. The patient's postoperative course was benign. Later, his progress was re-evaluated; his growth height had increased only 3 cm in 6 yr, his bone age was 216 mo. Nongerm cell testicular neoplasms are rare; removal of the tumor usually results in return to normal steroid levels. The clinical manifestations of Leydig cell tumors were well demonstrated by this case.

0362 FULMINATING PARAPONTINE EPIDERMOID CARCINOMA IN A FOUR-YEAR-OLD-BOY.

(Eng.) Wong, S. W. (Medical Univ. South Carolina, 80 Barre St., Charleston, SC 29401); Ducker, T. B.; Powers, J. M. *Cancer* 37(3): 1525-1531; 1976.

A unique case of primary intracranial epidermoid carcinoma in a 4-yr-old boy is described. Its parapontine localization and malignant features combined to produce a fulminating clinical course simulating an intra-axial mass lesion, and death within three months of the onset of symptoms. The probable origin of the carcinoma from a benign epidermoid cyst is discussed. A review of the world's literature establishes not only the rarity of cyst-derived intracranial epidermoid carcinoma, but also its unprecedented occurrence in the child.

0363 PRELEUKEMIA AND LEUKEMIA IN POLYCYTHEMIA VERA.

(Eng.) Meyetes, D. (Chaim Sheba Medical Center, Tel-Hashomer, Israel); Katz, D.; Ramot, B. *Blood* 47(2): 237-241; 1976.

Seventy-six polycythemia vera patients were followed prospectively with bone marrow examinations at regular intervals to determine the risk of acute leukemia as a terminal complication. Six patients terminated in acute leukemia, preceded by an indolent preleukemic phase succeeded by a fulminant leukemia. At autopsy, all patients had extramedullary hematopoiesis. In one, only the bone marrow was leukemic, suggesting that it was the primary site of this transformation. In three patients with leukemic involvement of nonhematopoietic organs, the infiltrate consisted of myelomonoblasts and normoblasts. The preleukemic phase was characterized by a rapidly evolving spontaneous pancytopenia, with a drop from polycythemic blood counts within 2 mo. In the bone marrow, megaloblastoid erythropoiesis with ring sideroblasts was prominent. A similar preleukemic phase, evolving in other potentially leukemic conditions, has been described. The authors conclude that in the patients at risk, the appearance of ring sideroblasts may be regarded as an early indicator of imminent acute leukemic transformation.

0364 APLASTIC ANEMIA FOLLOWED BY LEUKEMIA IN CONGENITAL TRISOMY 8 MOSAICISM: ULTRASTRUCTURAL STUDIES OF POLYMORPHONUCLEAR CELLS IN

PERIPHERAL BLOOD. (Eng.) Gafter, U. (Hasharon Hosp., Petah-Tiqva, Israel); Shabtai, F.; Kahn, Y.; Halbrecht, I.; Djaldetti, M. *Clin Genet* 9(2): 134-142; 1976.

The case of a 40-yr-old woman with congenital trisomy 8 and sex chromosome mosaicism is reported. The main clinical features were: mental retardation, thick and darkly pigmented skin, prominent forehead, convergent strabismus, high arched palate, flexion contractures of the extremities, and numerous skeletal abnormalities. The patient developed severe aplastic anemia followed by an interim period of preleukemia which developed into acute leukemia. Electron microscope examination of the mature granulocytes of both bone marrow and peripheral blood at the stage of the aplastic anemia showed ultrastructural abnormalities similar to those observed in other genetic disorders with a predisposition to leukemia, as well as in leukemia. The case provides evidence for the assumption that certain chromosomal abnormalities may be associated with morphological abnormalities of the granulocytes.

0365 SURFACE MORPHOLOGY OF NORMAL AND CHRONIC LYMPHOCYTIC LEUKAEMIA LYMPHOCYTES. (Eng.) Cohnen, G. (Dept. Medicine, Univ. Essen, Essen, W. Germany); Fischer, K.; Ludwig, H.; Brittinger, G. *Eur. J. Cancer* 12(3): 199-202; 1976.

Peripheral blood lymphocytes from eight normal subjects and ten patients with chronic lymphocytic leukemia (CLL) were studied by scanning electron microscopy. The surface morphology of normal lymphocytes showed considerable heterogeneity. Most cells had a small or moderate number of stub- or finger-like projections. In contrast, CLL lymphocytes exhibited a homogeneous surface architecture indicating the monoclonal nature of the neoplastic population. The dominating cell type either had sparse microvilli or was moderately to markedly villous in 9 of the 10 cases studied. Lymphocytes from one patient displayed a smooth, albeit slightly irregular, surface. The abnormality of leukemia lymphocytes was further indicated by their reduced cell size.

0366 ACUTE MYELOMONOCYTIC LEUKEMIA ASSOCIATED WITH PARAPROTEINEMIA. (Eng.) Law, I. P. (Hematology Service, Womack Army Hosp., Fort Bragg, NC 28307); Koch, F. J.; Cannon, G. B.; Herberman, R. B.; Oldham, R. K. *Cancer* 37(3): 1359-1364; 1976.

The case of a 49-yr-old white woman with refractory anemia who developed acute myelomonocytic leukemia with paraproteinemia 12 mo later is presented. The paraprotein was characterized as immunoglobulin G, type kappa, and the Bence Jones protein as free kappa chains. Further studies, including electron microscopy, cytochemistry, and immunofluorescence, provided evidence for synthesis of the paraprotein, both in vivo and in vitro, by the myelomonocytic leukemic cells.

0367 PRODUCTION OF COLONY-STIMULATING FACTOR BY LEUKEMIC LEUKOCYTES. (Eng.) Goldman, J. M. (Royal Postgraduate Medical Sch., Ducane Road, London W12 OHS, England); Th'ng, K. H.; Catovsky, D.; Galton, D. A. G. *Blood* 47(3): 381-388; 1976.

The production of colony-stimulating factor (CSF) by the peripheral blood cells of untreated patients with acute myeloid leukemia (AML) was measured in the agar culture system using normal human bone marrow as the source of colony-forming units (CFUc). CSF production was found to be variable and was related to the morphologic subtype of AML:cells from patients with monocytic leukemia produced normal or large quantities of CSF, while (with one exception) those from patients with myeloblastic leukemia produced little or no CSF. There was a relationship between CSF production and serum lysozyme levels. A consistent inhibitory effect exerted by leukemic peripheral blood cells on normal leukopoiesis in vitro was not seen. Results suggested that the addition to the feeder layer of cells from patients with monocytic leukemia could raise CSF levels above those obtained with normal peripheral blood leukocytes alone, possibly by recruiting additional CFUc from normal marrow.

0368 IN VITRO REGULATION OF GRANULOPOIESIS IN HUMAN LEUKEMIA: APPLICATION OF AN ASSAY FOR COLONY-INHIBITING CELLS. (Eng.) Broxmeyer, H. E. (Dept. Medicine, Queen's Univ., Kingston, Ontario, Canada K7L 3N6); Baker, F. L.; Galbraith, P. R. *Blood* 47(3): 389-402; 1976.

Two assays to detect the action of colony-inhibiting cells were described. In the first assay, a simple density separation technique to remove dense neutrophils (PMN) from suspensions of blood and of bone marrow cells prior to culture in semisolid agar was used. Conditions ensured that control suspensions of unseparated cells and test suspensions of buoyant mononuclear cells differed only in their content of neutrophils. The control and test suspensions contained equal numbers of mononuclear cells (and granulocyte precursors). Colony (and cluster) formation was invariably enhanced in neutrophil-depleted cultures of normal cells. In the second assay, dense PMN, treated by an adherence separation procedure, were recovered, and the nonadherent dense PMN were added back to PMN-depleted cultures. A reproducible dose-related decrease in colony (and cluster) formation to basal levels resulted. The inhibitory effect was identical when the PMN were added directly to the culture (overlayer) or to the underlayer. In PMN-depleted cultures obtained from patients with leukemia and other hemopoietic disorders, neither colony nor cluster formation was enhanced, and sometimes it was reduced. When the effect of adding patient and normal nonadherent PMN to target cultures of normal and patient PMN-depleted cells was compared, some leukemic PMN were noninhibitory. Results suggested that abnormalities of cellular interactions in vitro detected in the first assay may have more than one explanation, as shown when they are subjected to the closer scrutiny possible with the second assay.

0369 HODGKIN'S AND LYMPHOMA CASES (Letter to Editor). (Eng.) Pattison, J. ("Beneadie", Sunbury, Vic. 3429, Australia). *Med J Aust* 1(4): 100; 1976.

The cases of four lymphoma-cerebral tumors occurring in two families living on the same street are reported. In one family the mother contracted Hodgkin's disease and her son developed a cerebral tumor within weeks. In the other, the father contracted lymphatic leukemia about the same time and his son developed a cerebral tumor two years later. The first son worked with the neighboring father for one year before developing the tumor. A possible transmissible agent such as a cancer virus is suggested.

0370 SIMULTANEOUS OCCURRENCE OF MYELOMA AND HODGKIN'S DISEASE. (Eng.) Sacks, P. V. (Scripps Clinic and Res. Foundation, 476 Prospect St., La Jolla, CA 92037); Tavassoli, M.; Eastlund, D. T. *Acta Haematol* 55(2): 118-122; 1976.

The case report of a 51-yr-old man in whom both Hodgkin's disease and multiple myeloma were diagnosed simultaneously, in the absence of previous irradiation or chemotherapy, is presented. Laparotomy revealed Hodgkin's disease of the lymphocyte-depleted type involving the liver, spleen, and retroperitoneal lymph nodes. At the same time, the diagnosis of myeloma was established by the occurrence of an IgG-kappa paraprotein, kappa light chains in the urine, and myeloma cells in the marrow aspirate. Following treatment with six cycles of nitrogen mustard, vincristine, procarbazine, and prednisone at monthly intervals, the patient experienced complete remission of Hodgkin's disease lasting 11 mo. Following recurrence, the patient was treated with bleomycin, vincristine, and prednisone, resulting in rapid relief of symptoms. Because there are no reports of Hodgkin's disease developing at some time after the diagnosis of myeloma, the authors suggest that it is more likely that Hodgkin's disease predisposes to myeloma than the reverse.

0371 PRIMARY INTRACRANIAL BURKITT'S LYMPHOMA IN AN INFANT. (Eng.) Valsamis, M. P. (Albert Einstein Coll. Medicine, Bronx, NY 10461); Levine, P. H.; Rapin, I.; Santorineou, M.; Shulman, K. *Cancer* 37(3): 1500-1507; 1976.

A case of intracranial Burkitt's lymphoma is reported in a boy whose symptoms began at three months of age with a definite histologic diagnosis established at 18 mo. Serologic studies demonstrated high antibody titers to Epstein-Barr virus (EBV) in the patient and in four out of five members of the immediate family. The patient also demonstrated immunity to antigens derived from African Burkitt's lymphoma cell lines. The autopsy findings strongly support the case for the primary intracranial origin of the neoplasm, and a perinatal infection with EBV is probable in this case.

0372 BURKITT'S LYMPHOMA OF THE OVARY IN ASSOCIATION WITH PREGNANCY: TWO CASE REPORTS. (Eng.) Armon, P. J. (Kilimanjaro Christian Medical Center, Tanzania). *Br J Obstet Gynaecol* 83(2): 169-172; 1976.

Two cases of Burkitt's lymphoma of the ovary in association with pregnancy are presented. In the first patient, a 20-yr-old woman in the 4th mo of pregnancy, a large necrotic tumor was found arising from the right ovary. There was also a bleeding mass situated retroperitoneally involving the region of the left kidney, spleen, and stomach. The second patient was an 18-yr-old woman in the 10th wk of pregnancy. Bilateral solid ovarian tumors were found. Both fallopian tubes, the pylorus of the stomach, and the retroperitoneum were involved. Imprint cytology and microscopic examination of both tumors of the first patient and of the ovarian tumors in the second patient confirmed the diagnosis of Burkitt's lymphoma. The first patient died immediately after laparotomy, and the second patient's condition was deteriorating despite chemotherapy. The rapid spread of the tumors in these patients may have been enhanced by pregnancy; previous investigators have suggested a deficient cellular immunity in the pregnant patient.

0373 CANINE MALIGNANT LYMPHOMAS: COMPARISON OF MORPHOLOGIC AND IMMUNOLOGIC PARAMETERS. (Eng.) Holmberg, C. A. (Dept. Veterinary Pathology, Univ. California, Davis, CA 95616); Manning, J. S.; Osburn, B. I. *J Natl Cancer Inst* 56(1): 125-135; 1976.

Twenty-three canine malignant lymphomas were studied to correlate morphologic and immunologic properties of the neoplastic cells and the results were compared with morphological classifications. Morphologic characterization included histologic classification of cell type and growth pattern, anatomic distribution of lesions, and transmission electron microscopic examination. Parameters examined to indicate B- or T-cell nature of lymphoma cells included demonstration of mitogen responsiveness, cell-surface Ig, spontaneous rosette formation with human red blood cells, and scanning electron microscope examination of cell-surface features. Results indicated that the cells from histiocytic lymphomas were lymphocytes rather than histiocytes or macrophages. Most cells from lymphomas examined possessed cell-surface Ig, indicating

B-cell nature. The cell types represented by the different Ig-positive lymphomas were compatible with maturation arrest at different stages in normal lymphocyte differentiation. For the two most common histiologic cell types, mitogen responsiveness and the presence of cell-surface Ig indicated that diffuse, poorly differentiated lymphocytic cases were biologically heterogenous, whereas nodular histiocytic lymphomas were biologically homogenous. Most canine lymphomas has a multicentric anatomic distribution; however, one thymic and two alimentary forms were observed. Lymphomas with a nodular pattern in lymph nodes had multifocal splenic involvement centered on small arteries, whereas lymphomas with a diffuse pattern in lymph nodes had diffuse involvement of splenic white pulp. The cells of Ig-positive and Ig-negative neoplasms were predominantly of the smooth-cell type. The results indicate that there are several subgroups of canine malignant lymphoma. Lymphomas positive for surface Ig present a variety of cytologic types, diffuse and nodular patterns, and appreciably different rates of both control-culture and mitogen-induced DNA synthesis. The authors suggest that more definitive techniques are needed to differentiate subpopulations of B and T cells in the canine before their function in this malignancy can be defined adequately.

0374 LYMPHOBLASTIC LYMPHOMA OF CONVOLUTED OR ACID PHOSPHATASE TYPE - A TUMOR OF T PRECURSOR CELLS. (Eng.) Stein, H. (Dept. Pathology, Univ. Kiel, Hospitalstr. 42, D-2300 Kiel 1, W. Germany); Petersen, N.; Gaedicke, G.; Lennert, K.; Landbeck, G. *Int J Cancer* 17(3): 292-295; 1976.

Five lymphatic neoplasms with strong focal acid phosphatase reactivity were selected from a group of acute lymphocytic leukemias and lymphoblastic lymphomas. All five cases showed an anterior mediastinal mass and exhibited identical morphology. This type of lymphoma has been described by the term ''malignant lymphoma of convoluted lymphocytes.'' Analysis of surface membrane receptors revealed that the tumor cells lacked surface immunoglobulin and receptors for Fc-fragment, but possessed receptors for complement (C3), untreated SRBC (Es) and SRBC treated with neuraminidase (ENs). By applying a mixed rosette assay using nucleated chicken erythrocytes coated with antibodies and C3, and denucleated ENs, it was found that a considerable number of tumor cells in all five cases formed mixed rosettes, i.e. that they bore the C3 receptor characteristic of B cells and simultaneously the E receptor characteristic of T cells. Thus the tumor cells resembled immature thymocytes of 10-15 wk gestation, which also show focal acid phosphatase reactivity and simultaneous expression of C3 and E receptors.

0375 HISTOLOGICAL SEXING OF A RETICULUM CELL SARCOMA ARISING AFTER LIVER TRANSPLANTATION. (Eng.) Portmann, B. (King's Coll. Hosp., London, England); Schindler, A.-M.; Murray-Lyon, I. M.; Williams, R. *Gastroenterology* 70(1): 82-84; 1976.

The case report is presented of a 49-yr-old woman in whom a reticulum cell sarcoma confined to the allograft was found at necropsy after orthotopic liver transplantation. The histological sexing of the tumor is described. Liver tissue and tumor from the allograft were studied together with liver tissue from 28 necropsies, with or without liver disease. By the quinacrine fluorescence method, it was possible to identify the sex of each control patient using either hepatocytes or Kupffer cells. The mean Y-chromatin-positive cells in males were 46.6 and 38.9%, respectively, and for females, 3.8 and 3.8%. By the Feulgen method, the number of X-chromatin-positive Kupffer cells in males was determined to be 5.5%, and 26.6% in females. In sections of the liver graft (from a male donor), the values for X- and Y-chromatin counts fell within the range of the male controls. In contrast, the counts in the tumor cells pointed to a female origin (1.3% Y-chromatin-positive cells and 27% X-chromatin-positive cells). The fact that the tumor was host in origin, and that it was confined to the transplanted organ, confirmed that it must have developed within the 6-mo period from the time of transplantation to necropsy.

0376 THE HISTIOCYTIC NATURE OF DERMATOFIBROSARCOMA PROTUBERANS. (Eng.) Ozzello, L. (Univ. Lausanne Medical Sch., 1011 Lausanne, Switzerland); Hamels, J. *Am J Clin Pathol* 65(2): 136-48; 1976.

Specimens from four cases of dermatofibrosarcoma protuberans when explanted in vitro exhibited a typical ameboid outgrowth, confirming the histiocytic nature of these tumors. The cultures displayed the same evolution from macrophages to fibroblast-like cells observed previously in cultures of other types of histiocytomas. Electron microscopy confirmed the findings and suggested that the fibroblast-like cells were histiocytes with some secondarily acquired fibroblastic features. The possibility that neoplastic histiocytes may transform into true fibroblasts was deemed unlikely, but could not be excluded.

0377 NEVUS SEBACEOUS AND SYRINGOCYSTADENOMA PAPILLIFERUM. (Eng.) Greer, K. E. (Univ. Virgina Sch. of Medicine, Charlottesville, VA 22901); Bishop, G. F.; Ober, W. C. *Arch Dermatol* 112(2): 206-208; 1976.

A 52-yr-old man had two skin lesions, one on the forehead and one in the postauricular area, which had been present since birth. The forehead lesion was a nevus sebaceous and the postauricular lesion was a syringocystadenoma papilliferum. Except for a few patients with widespread nevus sebaceous and syringocystadenoma papilliferum associated with neurologic abnormalities, most of the previously reported patients with these nevi have had solitary lesions of one or the other. An association of nevus sebaceous and syringocystadenoma papilliferum in the same lesion is not uncommon.

0378 THE USE OF FREEZE-FRACTURE AND NEGATIVE STAINING TECHNIQUES TO STUDY THE ULTRASTRUCTURE OF MELANOSOMES ISOLATED FROM B16 MELANOMA. (Eng.) Lea, P. J. (Electron Microscopy Lab., Medical Sciences Bldg., Univ. Toronto, Toronto M5S 1A8, Canada); Haberman, H. F.; Pawlowski, A.; Menon, I. A. *J Anat* 121(1): 1-5; 1976.

The ultrastructure of melanosomes in B16 melanomas was studied by electron microscopy using freeze-fracture and negative staining techniques. B16 fractions, containing melanosomes and mitochondria (partially purified) and isolated melanosomes (purified), were negatively stained with 4% sodium silico-tungstate, and frozen in Freon 22. Cubes of whole tissue were used for freeze-fracture. A platinum/carbon film was made. Etching, by warming the specimen to 100 C to expose unfractured surfaces, was also carried out during every fracture process. The pre-melanosomes appeared to contain a number of parallel filaments with cross-striated periodicity. Etching showed melanosomes with a clearly double-layered membrane. The average length of melanosomes was 0.6 μm, the average width was 0.3 μm. Out of 100 counted, 33 melanosomes showed no evidence of an enclosing membrane; others showed membranes partially attached. Random fracture exposed spheres of melanin with an average diameter of 24 nm; melaning spheres revealed by negative staining had a mean diameter of 26 nm. It was not easy to identify melanosomes from B16 melanoma when whole tumor tissue was used when freeze-fracture techniques were employed, in contrast to observations on normal melanocytes.

0379 ANIMAL MODEL OF HUMAN DISEASE: MALIGNANT MELANOMA. (Eng.) Sobel, H. J. (East Orange General Hosp., 300 Central Ave., East Orange, NJ 07019); Marquet, E.; Kallman, K. D.; Corley, G. J. *Am J Pathol* 82(2): 441-444; 1976.

The use of platyfish (*Xiphophorus maculatus*) as an animal model for human malignant melanoma was investigated. All populations of platyfish are polymorphic for several sex-linked codominant macromelanophore factors which (within their pool of modifier genes) produce specific pigment patterns. When any of these pigment genes are introduced through hybridization into a foreign genome (i.e. the swordtail *X. helleri*) the expression of these genes is greatly enhanced by a deficiency in modifier genes; this leads first to melanosis, then to invasive melanoma. The site and pigmentation is predictable in most cases. In hybrids the proliferating macromelanophores replace the corial and subcutaneous tissues. Then the myoseptae are invaded. Later melanocytes (small, pigmented cells with spindle cells with prominent mitotic activity) appear, followed by tumorous development with almost complete disappearance of the melanophores; the fish succumb rapidly. Macromelanophores and melanocytes were found, by electron microscopy, to differ only in size and shape. Fish melanomas differ from human melanomas in several ways: they contain melanophores and only a few melanin granules are produced as in humans; they are more uniformly invasive and destructive; and they lack the irregular villous projections, junctional change, and desmosomes (and perhaps microtubules) seen in human lesions. This fish is recommended for the study of melanoma because of the ease of obtaining and keeping these fish.

0380 SIGNET-RING CELL CARCINOMA OF THE BREAST: THE MUCINOUS VARIANT OF INFILTRATING LOBULAR CARCINOMA? (Eng.) Steinbrecher, J. S. (Univ. Colorado Medical Sch., 4200 East Ninth Ave., Denver, CO 80220); Silverberg*, S. G. *Cancer* 37(2): 828-840; 1976.

Five cases of mammary signet-ring cell carcinoma were studied by light and electron microscopy. This tumor was characterized by the presence of numerous cells containing intracellular mucin, without large amounts of extracellular mucin as is seen in colloid (gelatinous, mucinous) carcinoma of the breast. Although such cells may be seen in many mammary carcinomas, they are never as frequent as in the variant described. Ultrastructurally, the most characteristic finding was the presence of numerous intracellular lumina containing material which appeared to represent the mucin identified with the light microscope. This finding differed from that in colloid carcinoma, in which the scantier intracellular mucin occurs in the form of intracytoplasmic membrane-bound vesicles. The five tumors were all associated with either in situ lobular carcinoma or a ''sinus catarrh''-like pattern of nodal metastases, or both. It is suggested that the signet-ring cell carcinoma is a variant of infiltrating lobular carcinoma, clinically and pathologically distinct from colloid carcinoma.

0381 CORTICOSTEROID SULFATE EXCRETION AND ESTROGEN RECEPTORS IN BREAST CANCER. (Eng.) Rose, D. P. (Univ. Hosp., 1300 University Ave., Madison, WI 53706); Liskowski, L. *Clin Chim Acta* 67(2): 183-187; 1976.

The urinary excretion of corticosteroid sulfates and free cortisol were determined in 150 breast cancer patients. Four of 60 cases of early breast cancer (7%) and 26 of 90 patients with advanced breast cancer (29%) showed an elevated urinary corticosteroid sulfate excretion. Urinary free cortisol was usually normal. Estrogen receptor assays were performed on tumor samples from 67 breast cancer patients; 24 were from primary lesions obtained at mastectomy, three from inoperable primaries in patients with systemic metastases, and 40 from metastases. Sixteen of the primary breast cancers (67%), 26 of the metastases (65%)

and one of the three inoperable primaries contained estrogen receptors. With two exceptions, patients with an increased urinary corticosteroid sulfate excretion also had estrogen receptor-containing tumors. The results confirm earlier findings that elevated urinary corticosteroid sulfate levels occur most frequently in advanced breast cancer with visceral metastases.

0382 TIME INTERVAL TO INVASIVE MAMMARY CARCINOMA IN PATIENTS WITH ATYPICAL SMALL-CELL DYSPLASIA AND IN SITU CARCINOMA. (Eng.) Toker, C. (Mount Sinai Sch. Medicine, New York, NY 10029). *Mt Sinai J Med* 43(1): 53-56; 1976.

Twelve patients who developed invasive carcinomas subsequent to the detection of small-cell mammary dysplasias are described. No correlation could be demonstrated between the severity of the initially detected lesion and the time to infiltration. The majority of the invasive tumors appeared within the 6- to 15-yr period following biopsy. Only three cancers developed during the first 5-yr period. On one occasion, a period of 18 yr elapsed before the appearance of an invasive tumor. These considerations may influence therapy in the case of an aged patient, or in patients who are suffering from other serious illnesses in addition to their breast lesion.

0383 LOCAL RECURRENCE OF BREAST CANCER. (Eng.) Deck, K. B. (Hosp. of the Good Samaritan, 1212 Shatto St., Los Angeles, CA 90017); Kern, W. H. *Arch Surg (Chicago)* 111(4): 323-325; 1976.

Pathologic and surgical aspects of 1,027 breast cancer cases treated between 1961 and 1972 are reviewed. Sixty-eight (7%) of the cases recurred locally. This low rate of recurrence was associated with the small average diameter (2.7 cm) of all carcinomas and the correspondingly low rate of axillary lymph node metastasis (40%). Subsequently recurring tumors had a higher incidence of axillary lymph node metastasis (68%). Eight hundred and eighty-eight infiltrating duct carcinomas represented the largest group of cases and had a recurrence rate of 5.7%. Comedo, infiltrating papillary, and infiltrating lobular carcinomas recurred locally more frequently, but none of 26 mucinous carcinomas recurred. In eight cases, the recurrent tumor was of a more malignant histologic type than the primary lesion. The average width of the excised segments of skin decreased from 9.8 cm during the first three-year period (1961-1963) to 8.4 cm during the last period (1970-1972). The average width for the entire period was 9.1 cm, identical for locally recurring and nonrecurring tumors.

0384 THE MECHANISM OF LATE LOCAL RECURRENCE OF CARCINOMA OF THE BREAST. (Eng.) Byrd, B. F. (St. Thomas Hosp., Nashville, TN 37203); Mody B.; Marsh, J. *South Med J* 69(1): 79-80; 1976.

A 43-yr-old white woman had a 1-yr history of a hard lump (2.5 cm in diameter) on the right breast lateral to the nipple that had increased in size. Shortly before treatment the patient noticed a small mass in the axilla. After 6-wk of preoperative radiotherapy a right radical mastectomy was performed; the diagnosis was medullary carcinoma with axillary node metastasis. At the age of 77 she presented a skin lesion in the scar of her mastectomy. There was serosanguinous drainage from the skin lesion for 3 wk before treatment. Examination revealed an indurated ulcer (1.5 x 2.0 cm); the diagnosis was ulcerated infiltrating duct carcinoma with involvement of the subcutaneous tissue and moderate fibrotic reaction without significant inflammatory infiltrate. She remains alive and well 16 mo after the recurrence. Such late recurrences remain a mystery; since tumor-specific antigens can create a host-immune response, perhaps the patient with delayed recurrence or metastasis had enough time to develop some degree of initial immunity, and tumor regression may be due to some hormonal factors or to interference factors which alter the host-tumor relation. Recurrence is often the first manifestation of widespread disease and the prognosis for such patients is poor.

0385 BRIEF COMMUNICATION: UNUSUAL CELL JUNCTIONAL COMPLEXES IN CANINE MAMMARY ADENOACANTHOMAS. (Eng.) Alroy, J. (Rush Medical Sch., Chicago, IL 60612); Weinstein, R. S. *J Natl Cancer Inst* 56(3): 667-670; 1976.

Unusual cell junctional complexes in spontaneously arising adenoacanthomas of canine mammary glands are reported. These complexes contained occludens junctions, a glandular cell component, and 100-F desmosomes, a squamous cell component. It is suggested that these complexes are apparently a manifestation of bidirectional differentiation of tumor cell membranes.

0386 OVARIAN MALIGNANCY SUBSEQUENT TO A LE FORT OPERATION. (Eng.) Sudo, N. (New York Medical Coll., 1249 Fifth Ave., New York, NY 10029); Goldberg, T.; Sall, S. *Am J Obstet Gynecol* 124(2): 210-211; 1976.

A case of ovarian malignancy in a 56-yr-old woman following a Le Fort colpocleisis three years previously is presented. Laparotomy revealed a 5 x 5 cm adnexal mass with papillary seeding on the Fallopian tubes, the uterus, and the right ovary. There was diffuse seeding of tumor over the serosal surfaces of the small intestine and omentum. A total abdominal hysterectomy and bilateral salpingo-oophorectomy and omentectomy were performed. Extirpation of the cervix was not hindered by the prior Le Fort procedure. This is the first reported case of ovarian malignancy following a Le Fort colpocleisis.

0387 HUMAN BREAST CARCINOMA: HETEROTRANSPLANTATION TO NEWBORN RATS. (Eng.) Benjamin, I. (Saint Louis Univ. Sch. Medicine, 1402 South Grand Boulevard, Saint Louis, MO 63104); Pinkerton, H. *Cancer Lett* 1(4): 203-206; 1976.

Cultured cells from a human breast carcinoma were injected sc in newborn cortisone-treated Sprague-Dawley rats (CNBR). Tumors of predominantly epithelial nature appeared in all within 30 days, and widespread metastases occurred often. Cells cultured from these tumors rapidly produced similar tumors in CNBR. Rat-to-rat passage by implanting fragments of tumor tissue was 100% successful in CNBR. This in vivo model is simple and inexpensive.

0388 A SURVEY OF EPITHELIAL INCLUSIONS IN THE OVARIAN CORTEX OF 470 PATIENTS. (Eng.) Mulligan, R. M. (Univ. Colorado, Sch. Medicine, 4200 East Ninth Ave., Denver, CO 80220). *J Surg Oncol* 8(1): 61-66; 1976.

An analysis of the ovaries of 470 patients obtained at operation for assorted indications revealed 178 (37.8%) of them with 193 ovarian cysts and tumors. The most striking result was that cervical (mucinous) epithelial inclusions respond in an apparent almost totally obligatory fashion to whatever forces drive them into neoplasia, whereas tubal (serous) and endometrial epithelial inclusions are so stimulated in about 10 of 25 instances or 40% of their rate of occurrence. Of 63 serous epithelial tumors, 21 or 33.3% were malignant; of 27 mucinous epithelial tumors, three of 27 or 11.0% were malignant; and of 23 endometrial epithelial tumors, two or 8.7% were malignant.

0389 VALUE OF SCREENING PROCEDURES FOR THE DETECTION OF VAGINAL ADENOSIS. (Eng.) Gunning, J. E. (Harbor General Hosp., 1000 West Carson St., Torrance, CA 90509); Ostergard, D. R. *Obstet Gynecol* 47(3): 268-271; 1976.

The study described the use of routine vaginal iodine staining and other screening procedures for the detection of vaginal adenosis in 3871 postpubertal female patients. Iodine staining identified 65 patients with nonstaining areas in the vagina. Colposcopy verified the presence of vaginal adenosis in 11 of the 65 patients. Directed biopsies confirmed the diagnosis in 10 patients. The iodine staining procedure detected vaginal adenosis in only 1 patient who did not have a positive history of diethylstilbestrol (DES) exposure or coexisting physical findings. Iodine staining of the vagina has little value as a screening procedure for the detection of vaginal adenosis. Based on these findings, a careful medical history and vaginal examination are recommended as the most productive routine screening procedures for vaginal adenosis. Evaluation and followup of those patients with a history of DES exposure in utero or physical findings suggestive of vaginal adenosis should include vaginal Papanicolaou smears supplemented by colposcopy at 6-mo to 1-yr intervals. Colposcopically directed biopsies of all abnormal areas should be obtained.

0390 CARCINOMA IN SITU OF THE VAGINA FOLLOWING TREATMENT FOR CARCINOMA OF THE CERVIX: A DISTINCTIVE CLINICAL ENTITY. (Eng.) Geelhoed, G. W. (Natl. Cancer Inst., Natl. Inst. Health, Bethesda, MD 20014); Henson, D. E.; Taylor, P. T.; Ketcham, A. S. *Am J Obstet Gynecol* 124(5): 510-516; 1976.

A series of ten patients who presented with carcinoma in situ of the vagina following treatment for carcinoma of the cervix were seen in a three year period, and their clinical and histologic features were reviewed. Vaginal lesions developed 1-22 yr after the diagnosis of carcinoma of the cervix was made. In three patients the vaginal lesions progressed to invasion. In the remaining patients, repeated biopsies revealed persistent carcinoma in situ. It is concluded that the biologic behavior of vaginal carcinoma in situ following carcinoma of the cervix resembles that of carcinoma in situ of the cervix, and that carcinoma of the vagina following carcinoma of the cervix should be considered a separate clinical entity distinct from primary invasive carcinoma of the vagina.

0391 HYDATIDIFORM MOLE: TWO ENTITIES (Letter to Editor). (Eng.) Stone, M. (Charing Cross Hosp. (Fulham), London W6 8RF, England); Bagshawe, K. D. *Lancet* 1(7958): 535-536; 1976.

The risk of malignant trophoblastic neoplasia development in association with partial or transitional hydatidiform mole is discussed. In a series of 611 patients treated for hydatidiform mole by uterine evacuation, the risk for non-classic mole giving rise to trophoblastic tumor was about 1/50, whereas for normal term deliveries the risk of choriocarcinoma is about 1/50,000. In this series, classic moles accounted for 68% of all moles; in a previous article, this figure was only 29%, suggesting that the criteria for defining and following up partial or transitional moles are somewhat arbitrary. The authors conclude that the ability to predict which moles are likely to give rise to a trophoblastic tumor would be useful, but would be helpful only if comparable in reliability to follow-up by human chorionic gonadotrophin radioimmunoassay.

0392 LUTEOMA OF PREGNANCY: ULTRASTRUCTURAL FEATURES. (Eng.) Garcia-Bunuel, R. (Baltimore City Hosp., Baltimore, MD 21224); Brandes, D. *Hum Pathol* 7(2): 205-214; 1976.

The ultrastructural configuration of the cells in a case of pregnancy luteoma in a 25-yr-old woman was studied by conventional electron microscopy.

The fine structure of these cells conformed closely to that of steroid hormone producing cells in other human organs, particularly in terms of the presence of abundant smooth endoplasmic reticulum, dispersed Golgi apparatus, and tubular cristae in the mitochondria. Similarities were noted among the pregnancy luteoma cells and, as described by other authors, the luteinized granulosa and theca cells of the human corpus luteum and the cells of spontaneous mouse luteoma. There was a more pronounced resemblance to the granulosa cells of the corpus luteum than to the luteinized theca cells or the mouse luteoma cells, but with considerable overlap among all of them. Distinctive features, not previously described, were noted in the pregnancy luteoma cells, in the form of deep cytoplasmic invaginations of the cell membrane closed by tight junctions, and peculiar pleated sinuous membranous arrays within the cytoplasm. Mesenchymal cells of ambiguous differentiation were noted in the stroma of the tumor, suggesting that the stimulus to luteinized cell proliferation may transcend the specific ovarian mesenchymal cells and may also be exerted on the supporting stroma. On the basis of previous reports, it is concluded that although these tumors recapitulate the endocrine functions of the normal ovarian stroma rather than those of the corpus luteum, the cytoarchitecture covers a much broader spectrum of differentiation, which may come to closely resemble that of luteinized granulosa cells.

0393 IS THE TROPHOBLASTIC THESIS OF CANCER VALID? (Eng.) Navarro, M. D. (UST Res. Center, Manila, Philippines); Guevara, B. Q. *Acta Manilana Ser. A* 14(22): 1-19; 1975.

Human chorionic gonadotropin (HCG) was isolated from the urine of 25 histologically proven cancer patients by gel chromatography, dialysis, and freeze-drying. The freeze-dried fractions found positive in HCG immunoassay were injected into rabbits. The anti-HCG serum obtained was found to detect HCG in the urine of cancer patients and of five pregnant women. UV spectral patterns at 280 nm of the fractions obtained by gel chromatography appeared similar in cancer patients and in pregnant individuals. Infrared spectra of freeze-dried HCG standard, that from pregnant women, and that from cancer patients also had some similarities.

0394 IMMUNOFLUORESCENT LOCALISATION OF HUMAN PREGNANCY-SPECIFIC β-GLOBULIN IN PLACENTA AND CHORIOEPITHELIOMA. (Eng.) Tatarinov, Y. S. (Second Moscow Medical Inst., Moscow G-435, USSR); Falaleeva, D. M.; Kalashinikov, V. V.; Toloknov, B. O. *Nature* 260(5548): 263; 1976.

Using indirect immunofluorescence, the human pregnancy-specific beta$_1$-globulin was located in human placenta and chorioepithelioma of the uterus. Specific immunofluorescence was found in placenta obtained after normal birth or at abortions carried out at 6-12 wk gestation, and in chorioepitheliomas. Immunofluorescence was not found in lung, muscle, spleen, brain, pancreas, gastrointestinal tract, or liver taken from autopsy specimens of patients with either chorioepitheliomas (without metastases) or nonmalignant disease. It was associated with the cytotrophoblast and syncytiotrophoblast of the chorion in immature placenta and with residual trophoblast and fibrin islands in term placenta. In chorioepithelioma, specific fluorescence was also associated with giant trophoblastic cells (Langhans cells) or fibrin islands. The authors suggest that production of this particular beta$_1$-globulin may start in the Langhans cells and continue in the syncytiotrophoblast of the normal chorion and in the trophoblast cells of chorioepitheliomas.

0395 ELASTOGENESIS IN ADENOMATOID TUMOR: HISTOCHEMICAL AND ULTRASTRUCTURAL OBSERVATIONS. (Eng.) Akhtar, M. (Univ. Texas Health Sci. Center, 6400-W. Cullen St., Houston, TX 77025); Reyes, F.; Young, I. *Cancer* 37(1): 338-345; 1976.

An adenomatoid tumor from the uterine round ligament of a 50-yr-old woman was studied by light and electron microscopy to elucidate the morphogenesis and histogenesis of these tumors. Ultrastructurally the tumor was remarkably similar to normal as well as neoplastic mesothelium, supporting the concept of a mesothelial origin of adenomatoid tumors. Comparative histochemical and ultrastructural studies revealed presence of acid mucopolysaccharides mainly along the luminal borders of the tumor cells, indicating likely production of this material by the tumor cells as opposed to the stromal cells. The stroma was rich in elastic fibers and there was evidence of active elastogenesis. This paper represents the first unequivocal demonstration of elastogenesis in an adenomatoid tumor.

0396 PROGNOSTIC SIGNIFICANCE OF ENDOMETRIAL EXTENSION FROM PRIMARY CARCINOMA OF THE UTERINE CERVIX. (Eng.) Perez, C. A. (Mallinckrodt Inst. Radiology, 510 S. Kingshighway, St. Louis, MO 63110); Zivnuska, F.; Askin, F.; Kumar, B.; Camel, H. M.; Powers, W..E. *Obstet Gynecol Surv* 31(2): 160-161; 1976.

The poor prognosis of women with endometrial extension of primary cervical carcinoma was discussed with regard to staging procedures. The patients were divided into four groups according to a retrospective view of their D & C specimens. In the 24 patients with definite endometrial invasion there was an increased incidence of distant metastasis and a worse 3- and 5-yr survival rate when compared with the group who had a negative D & C. The results suggest that a reconsideration of staging procedures is indicated; endometrial extension should be considered.

0397 ULTRASTRUCTURAL ALTERATIONS IN LIVERS WITH METASTASIS. (Eng.) Alburkerk, J. (Nassau County Medical Center, 2201 Hempstead Turnpike, East Meadow, NY 11554); Duffy, J. L. *Arch Pathol Lab Med* 100(3): 168-171; 1976.

Thirteen biopsy specimens of livers that contained metastatic carcinoma were examined ultrastructurally. Degenerative alterations of the mitochondria, cystic dilatation of the endoplasmic reticulum, increased amounts of osmiophilic material, some in various stages of autophagocytosis, and lipid vacuoles within the hepatocytes were observed. In ten cases, the hepatocytes demonstrated mitochondrial paracrystalline inclusions. The observation of the latter structures in edematous hepatocytes containing phospholipid-rich osmiophilic deposits supports the hypothesis that paracrystalline inclusions are caused by the precipitation of unmasked phospholipids. The spectrum of ultrastructural findings suggests hypoxia and impaired lipid metabolism of the hepatic tissue as a result of congestion and bile stasis caused by the tumor nodules.

0398 RHABDOMYOMA OF THE LARYNX: REPORT OF A CASE. (Eng.) Bagby, R. A. (503 De Leon, Tampa, FL 33606); Packer, J. T.; Iglesias, R. G. *Arch Otolaryngol* 102(2): 101-103; 1976.

The first case of rhabdomyoma of the larynx that was removed under microsurgical conditions is reported. Indirect laryngoscopy disclosed a mass in the right false cord of the patient, a 55-yr-old man. Under microscopic visualization, the mucosa overlying the lesion was incised, and the tumor was removed through the laryngoscope. The patient was free of recurrence two years later. The cytoplasm contained large numbers of mitochondria and randomly scattered aggregates of myofibrils, which in occasional cells were better organized and formed parallel arrays, producing the light microscopic appearance of cross striations. Rod-shaped structures observed with light microscopy were identified by electron microscopy to be elongated, hypertrophied aggregates of Z line material.

0399 OBSERVATIONS ON SMALL GRANULE CELLS IN ADULT HUMAN BRONCHIAL EPITHELIUM AND IN CARCINOID AND OAT CELL TUMORS. (Eng.) McDowell, E. M. (Univ. Maryland Sch. Medicine, Baltimore, MD 21201); Barrett, L. A.; Trump, B. F. *Lab Invest* 34(2): 202-206; 1976.

Bronchial specimens from 40 patients were examined by electron microscopy for small granule cells. Rarely, these cells were seen abutting the lumen of the airway. It is suggested that luminal small granule cells may be a rare, although normal, component of the adult human bronchial epithelium. The dense core granules of the small granule cells stained intensely with phosphotungstic acid at low pH, suggesting that they contain glycoprotein. Granules present in a carcinoid and an oat cell tumor stained similarly. The role of the small granule cell in the genesis of bronchial carcinoid and oat cell tumors is recognized.

0400 METASTASIZING TUMORS FROM SERUM-SUPPLEMENTED AND SERUM-FREE CELL LINES FROM A C57BL MOUSE LUNG TUMOR. (Eng.) Franks, L. M. (Imperial Cancer Res. Fund, Lincoln's Inn Fields, London WC2A 3PX, England); Carbonell, A. W.; Hemmings, V. J.; Riddle, P. N. *Cancer Res* 36(3): 1049-1055; 1976.

A tissue culture cell line was established from an alveologenic lung carcinoma from a C57BL/lcrf-a' mouse. The cells were maintained in a completely defined serum-free medium. Tumors derived from the tissue culture cells grown in serum-free or serum-supplemented medium gave rise to lung metastases 40 days after sc implantation. The ultrastructure of the tissue culture cells in both media was similar to that of spontaneous or induced alveologenic mouse lung tumors. This line should be of great value in work on metastasis and in immunological studies, since it avoids problems concerned with the transfer of protein components of the tissue culture medium.

0401 UNILATERAL MULTIPLE TUMOURS OF THE PAROTID GLAND. (Eng.) Gaynor, E. B. (Norwalk Medical Center, 153 East Ave., Norwalk, CT 06851); Hershberg, R. *J Laryngol Otol* 90(3): 295-298; 1976.

A rare case of unilateral multiple tumors of different histological types in the parotid gland is reported. A 63-yr-old Caucasian man had a benign mixed tumor and an adenolymphoma of the right parotid gland. The former was an encapsulated mass, with both epithelial and mesenchymal components, while the latter was completely separate, being in the lymphoid tissue bordering the gland.

0402 LIGHT AND ELECTRON MICROSCOPIC FEATURES OF A PITUITARY ADENOMA IN NELSON'S SYNDROME. (Eng.) Kovacs, K. (St. Michael's Hosp., 30 Bond St., Toronto, Ontario, Canada); Horvath, E.; Kerenyi, N.; Sheppard, R. H. *Am J Clin Pathol* 65(3): 337-343; 1976.

Electron microscopy of an amphophil pituitary adenoma surgically removed from a 51-yr-old woman with Nelson's syndrome revealed that the tumor was composed of melanocorticotroph cells. This finding is consistent with the view that in the human pituitary gland one single cell type produces both ACTH and melanocyte-stimulating hormone (MSH). In contrast to the ultrastructure of pituitary adenomas associated with Cushing's syndrome, no microfilaments, or very few, were detected in the cytoplasm of the tumor cells, suggesting that adrenocortical steroids are required for the formation of microfilaments. The presence or absence of microfilaments in the tumor cells may be regarded as a distinguishing ultrastructural feature between Cushing's syndrome and Nelson's syndrome. It appears that changes in the level of circulating corticoids may affect the ultrastructural features of melanocorticotroph cells not only in normal human pituitaries but also in adenohypophyseal adenomas.

0403 CARCINOID TUMORS OF THE THYMUS. (Eng.) Salyer, W. R. (Johns Hopkins Hosp., Baltimore, MD 21205); Salyer, D. C.; Eggleston, J. C. *Cancer* 37(2): 958-973; 1976.

Three patients (two women, aged 54 and 87, and a 35-yr-old man) with carcinoid tumors of the anterior mediastinum are described. Study of these patients and an analysis of previously reported cases indicate that the thymus is the primary site of these tumors, which are probably related to the presence of Kulchitsky cells in normal thymus. These neoplasms differ clinically and anatomically from conventional thymomas. They occur predominantly in men, are not associated with myasthenia gravis or red-cell hypoplasia, and are more aggressive tumors than thymomas. Histologically, they are similar to carcinoid tumors of other organs and differ from the variable combination of epithelial cells and lymphocytes of thymomas. Although they are usually locally invasive and frequently metastasize, the clinical course is usually protracted. The reported examples of Cushing's syndrome related to thymomas are actually thought to be associated with thymic carcinoid tumors.

0404 EVIDENCE FOR SIGNIFICANT HEMATOPOIESIS IN THE HUMAN THYMUS. (Eng.) Taylor, C. R. (Univ. Southern California Medical Sch., 2025 Zonal Ave., Los Angeles, CA 90033); Skinner, J. M. *Blood* 47(2): 305-313; 1976.

The large pyroninophilic cells of the connective tissue of thymuses from 16-34th gestational-wk fetuses, and from stillbirths, and neonatal and childhood deaths, were studied. Chloroacetate esterase, peroxidase, pseudoperoxidase, mast cells, and eosinophils were studied histologically. The indirect immunoperoxidase method for the presence of hemoglobin A (HbA) and F (HbF), for lysozyme (muramidase) and immunoglobulins α, μ, γ, κ, and λ was used. Positive staining was seen in cells in the connective tissue stroma using all methods, and the cells stained corresponded to one or another of the types of pyroninophilic cells present. The finding of large cells with positive chloroacetate esterase and antilysozyme indicates the presence of granulopoiesis. Similarly, the presence of large nucleated cells with pseudoperoxidase and anti-hemoglobin (A and F) staining indicates the presence of erythropoiesis in thymuses from midterm fetuses. Plasma cells were present in small numbers in all fetuses older than 20 wk.

0405 THE SIGNIFICANCE OF HEMATOGENOUS TUMOR CELL CLUMPS IN THE METASTATIC PROCESS. (Eng.) Liotta, L. A. (St. Luke's Hosp., Cleveland, OH 44104); Kleinerman, J.; Saidel, G. M. *Cancer Res* 36(3): 889-894; 1976.

The relation among the size distribution of vessels in an implanted T241 fibrosarcoma C57BL mouse system, the size distribution of tumor cell clumps collected in the venous effluent of the tumor, and the development of pulmonary metastases was studied to evaluate the importance of clumps and their site of formation in the metastatic process. The size distribution of tumor cell clumps on days 7, 10, 12 and 15 following tumor implantation demonstrated a similar distribution for all clump classes (2 to 3 cells, 4 to 5 cells, and 6 to 7 cells), except 8 or more cell clumps. The proportion of of 8+ cells increased significantly with time and was associated with decreased proportions of smaller clumps up to day 15. A negative exponential character for both the size distribution of effluent tumor clumps and the tumor vessel population was observed. Tumor trauma or massage increased total tumor cells and clumps released into the effluent. Serial amputation demonstrated that tumor cells are continuously being released on a day-by-day basis in vivo. A linear relationship existed between the proportion of vessels with diameters large enough to pass a tumor clump of a given size and the proportion of clumps of that size within the venous effluent. Injection of tumor cells in clumps of 6 to 7 cells produced a significantly greater number of metastatic foci than did a similar number of single tumor cells; larger clumps produced significantly more metastatic foci than did smaller clumps matched for the number of cells. These studies verify the significance of tumor clumps in the metastatic process. The authors suggest that tumor cell clumps arise locally within the vascular bed of the tumor.

0406 MICROFLUOROMETRY OF NUCLEAR ACRIDINE ORANGE METACHROMASIA IN LYMPHOCYTES OF THYMUS, SPLEEN, AND BLOOD OF AKR AND RANDOM-BRED MICE. (Eng.) Alvarez, M. R. (Dept. Biology, Univ. South Florida, Tampa, FL 33620). *Cancer Res* 36(3): 895-900; 1976.

Lymphocyte chromatin lability to acid hydrolysis was studied using acridine orange fluorescence metachromasia in a high-lymphocytic-leukemia-susceptibility strain (AKR/J) and random-bred mice (ICR/Dub). Comparisons were made of blood, thymus, and spleen lymphocytes between random-bred, ''normal'' AKR, and leukemic AKR animals. The leukemic mice were in the stages of the disease characterized by enlarged thymus and spleen but preceding massive elevation of blood lymphocytes. The ranges of the mean chromatin acid lability overlapped and were nearly identical in peripheral blood lymphocytes. However, thymic and splenic lymphocytes showed a marked rise in mean chromatin acid lability in the leukemic animals. The ranges of the mean values of this parameter were also found to be far greater in the lymphopoietic organs of normal AKR than in the random-bred mice. The data indicate that lymphocyte chromatin acid lability is related to anatomical evidence of lymphocytic leukemia and that anatomically normal AKR animals of an age in which they are highly susceptible to spontaneous lymphocytic leukemia may contain a greater number of lymphoblasts in both the spleen and the thymus than do comparable random-bred mice. The implications of these findings are discussed in relation to strain differences and the concept of thymic origin of lymphocytic leukemia in mice.

0407 DEVELOPMENT OF FEWER TUMOR COLONIES IN LUNGS OF ATHYMIC NUDE MICE AFTER INTRAVENOUS INJECTION OF TUMOR CELLS. (Eng.) Skov, C. B. (Biology Div., Oak Ridge Natl. Lab., P.O. Box Y, Oak Ridge, TN 37830); Holland, J. M.; Perkins, E. H. *J Natl Cancer Inst* 56(1): 193-195; 1976.

The formation of tumor colonies was compared in the lungs of athymic nude and normal littermate mice after an iv injection of transplantable syngeneic tumor cells. Mice were exsanguinated 14-21 days after the injection, depending on the growth rate of the tumor. The lungs were inflated, fixed, and cleared for the tumor colony counts. Each of five tumors tested (a fibrosarcoma, B-16 melanoma, a carcinoma, a sarcoma, and an adenocarcinoma) formed fewer colonies in the lungs of nude recipients than in the normal mice. This demonstrates that healthy athymic mice may afford a less favorable environment for growth of some tumor types.

0408 TUMORIGENICITY OF L CELL DERIVATIVES AND HYBRID CELLS DERIVED FROM THEM. (Eng.) Wiener, F. (Dept. Tumour Biology, Karolinska Institutet, S 04 01 Stockholm 60, Sweden); Klein, G.; Harris, H. *Cancer Lett* 1(4): 207-210; 1976.

Hybridization studies on high (A9HT and B82HT3) and low malignant L cell derivatives (A9 and B82) showed that crosses between highly tumorigenic and poorly tumorigenic lines led to a marked suppression of the malignant phenotype. Malignant behavior was not, however, suppressed when cells from one highly tumorigenic line were crossed with those of another tumorigenic line. These rules applied even when all the cells crossed were closely related derivatives of one cell line.

0409 THE GROWTH CHARACTERISTICS OF METASTASES FROM EXPERIMENTAL RENAL TUMORS. (Eng.) Muntzing, J. (Roswell Park Memorial Inst., NY); Williams, P. D.; Murphy, G. P. *Res Commun Chem Pathol Pharmacol* 13(3): 541-550; 1976.

A hypothesis was tested that transplanted metastatic cells would give rise to more rapidly growing tumors with a higher frequency of metastasis formation than in the case of transplanted tumor cells obtained from the primary. Wistar-Furth rats and BALB/c mice were implanted sc or intrarenally with tumor cells from metastases or primaries of an experimental Wilms' tumor or an experimental renal cell adenocarcinoma. The survival time, metastasis formation and growth of the primary tumor after implantation of metastatic tumor cells did not exceed those found after implantation of tumor cells from the tumor primaries. It is concluded that the higher growth rate usually found in metastases is not necessarily due to a selection of metastatic cells with a short cell growth cycle but that there are other environmental factors enhancing the growth of metastases.

0410 CHROMOSOME DAMAGE IN DOWN'S SYNDROME INDUCED BY CHICKENPOX INFECTION. (Eng.) Higurashi, M. (Faculty Medicine, Univ. Tokyo, Hongo, Bunkyo-ku, Tokyo 113, Japan); Tada, S.; Miyahara, S.; Hirayama, M.; Hoshina, H.; Tamura, T. *Pediatr Res* 10(3): 189-192; 1976.

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0484 PLASMOCYTOMA WITH IGM PARAPROTEINEMIA. A CASE REPORT. (Eng.) Fagiolo, E. (Istituto di Clinica Medica, Universita Cattolica del Sacro Cuore, Roma, Italy). *Acta Haematol* 55(2): 123-128; 1976.

0485 ULTRASTRUCTURAL STUDIES OF EXPERIMENTAL HAEMATOGENOUS AND LYMPHOGENOUS METASTASES (VOLUME I) (Abstract). (Eng.) Josephson, R. L. (Univ. Western Ontario, Canada). *Diss Abstr Int B* 36(8): 186-192; 1975.

0486 HISTOCHEMICAL STUDIES ON STEROID 3β-OL DEHYDROGENASE AND RELATED ENZYMES IN HOST ORGANS OF TUMOR-BEARING MICE. (Eng.) Miyashita, T. (Gifu Univ. Sch. Medicine, Gifu 500, Japan). *Acta Histochem Cytochem* 8(3): 186-192; 1975.

0487 CHANGES IN SUBCELLULAR DISTRIBUTION OF S-ADENOSYLMETHIONINE DECARBOXYLASE IN REGENERATING AND IN DEVELOPING RAT LIVER. (Eng.) Sturman, J. A. (Inst. Basic Res. Mental Retardation, Staten Island, NY); Gaull, G. E. *Biochim Biophys Acta* 428(1): 70-77; 1976.

0488 SPONTANEOUS TUMORS IN THE DUNKIN-HARTLEY GUINEA PIG. (Eng.) Ediger, R. D. (Natl. Cancer Inst. Frederick Cancer Res. Center, Frederick, MD 21701); Kovatch, R. M. *J Natl Cancer Inst* 56(2): 293-294; 1976.

See also:

* (Rev): 0002, 0005, 0013, 0016, 0017, 0018, 0019, 0020, 0021, 0025, 0030, 0032
* (Chem): 0046, 0063, 0067, 0088, 0089, 0091, 0108, 0114, 0124, 0125, 0126
* (Phys): 0130, 0140
* (Viral): 0192, 0204, 0219
* (Immun): 0271, 0287, 0288, 0295, 0309, 0310, 0311, 0324, 0325, 0331, 0333, 0336
* (Epid-Biom): 0490, 0493, 0495, 0496, 0502

0489 NITRATE IN WATER SUPPLIES. (Eng.) Geleperin, A. (Sch. Public Health, Univ. Illinois, Chicago, IL); Moses, V. J.; Fox, G. *Ill Med J* 149(3): 251-253; 1976.

A model study was conducted in ten English cities to determine the possible carcinogenic effects of nitrates in the water supply. One community had high nitrate concentrations (90 mg/liter) and the other nine served as controls. The one high nitrate community and one control had significantly higher percentages of stomach cancer (26% and 27%) than the remaining eight communities. The ratio of observed to expected deaths was 1.31 in men and 1.93 in women. The respective values were 0.95 and 1.00 for bladder cancer. A similar study was conducted in three Illinois communities that had, respectively, insignificant nitrate, 40-45 ppm nitrate, and high nitrate water concentrations. The proportional mortality rates by cancer location for three age groups in the three communities showed no significant differences among the localities. Over an eight year period between 1959 and 1966, no significant differences were found among the three localities in mortality rate.

0490 POLYPS AND DIVERTICULOSIS OF LARGE BOWEL IN AUTOPSY POPULATION OF AKITA PREFECTURE, COMPARED WITH MIYAGI. HIGH RISK FOR COLORECTAL CANCER IN JAPAN. (Eng.) Sato, E. (Tohoku Univ. Sch. Medicine, 2-1 Seiryomachi, Sendai, Japan); Ouchi, A.; Sasano, N.; Ishidate, T. *Cancer* 37(3): 1316-1321; 1976.

The frequency and histologic features of polyps and diverticulosis of the large bowel were studied among indigenous Japanese. Three hundred large intestines obtained at necropsy from patients in Akita and 471 from patients in Miyagi were examined. Adenomatous polyps were more numerous in Akita (30%) than Miyagi (18.3%). They were also larger and showed more severe atypia in Akita. The sigmoid colon and rectum showed the most severe atypia in both prefectures. Hyperplastic polyps and diverticula were very uncommon in both prefectures. These results are discussed in relation to the different levels of risk to colorectal carcinoma in these prefectures and in Japanese migrants to Hawaii.

0491 A COHORT STUDY ON MORTALITY FROM CANCER AND OTHER CAUSES AMONG WORKERS AT A METAL REFINERY. (Eng.) Tokudome, S. (Faculty Medicine, Kyushu Univ., Fukuoka, Japan); Kuratsune, M. *Int J Cancer* 17(3): 310-317; 1976.

A non-concurrent prospective study was made on deaths from cancer and other causes occurring among 2,675 male workers at a metal refinery from 1949 to 1971. The expected number of deaths computed by applying age- and cause-specific death rates of Japanese males to these workers was compared with the observed number of deaths. Among 839 copper smelters, significantly increased mortalities were noted for lung cancer (SMR = 1,189) and colon cancer, but not for cancer of the stomach, liver (primary) and biliary passages, pancreas and skin or for leukemia, tuberculosis, cerebrovascular diseases, heart diseases and liver cirrhosis. A dose-response relationship was demonstrated between the mortality from lung cancer and the degree of exposure. A very high excess mortality from lung cancer (SMR = 2,500) was seen among copper smelters, who were considered to have been most heavily exposed to arsenic, or workers who had engaged in sintering and blast furnace operations for 15 years or more before 1949. The latent period of lung cancer was 37.6 years on average, and was not related to level of exposure. Twenty-six of 29 deaths from lung cancer among copper smelters occurred after they had left the refinery. Other production workers and clerical workers showed no significant excess mortality from any kind of cancer.

0492 BURKITT'S LYMPHOMA IN THE MENGO DISTRICT OF UGANDA: EPIDEMIOLOGIC FEATURES AND THEIR RELATIONSHIP TO MALARIA. (Eng.) Morrow, R. H. (Harvard Sch Public Health, 665 Huntington Ave. Boston, MA 02115); Kisuula, A.; Pike, M. C.; Smith P. G. *J Natl Cancer Inst* 56(3): 479-483; 1976.

An epidemiologic study of 123 patients residing in the Mengo Districts of Uganda, with onset of symptoms of diagnosed Burkitt's lymphoma (BL) in the period 1959-1968, revealed a substantial decline in annual incidence, particularly during the last 3 yr. Other significant findings included differences by ethnic group in age of patient at onset of BL, a change in the proportions of patients by ethnic group over the decade, a lower incidence rate of BL in the counties of higher altitude, and a seasonal pattern of onset. There was no evidence of the time-space clustering previously reported for BL in Uganda. The changing pattern of BL in the Mengo Districts was consistent with the hypothesis that severe malaria infection is not only important in the development of BL, but also precipitates onset.

0493 SQUAMOUS CELL CARCINOMA OF THE ORAL SOF TISSUES: A STATISTICAL ANALYSIS OF 14,253 CASES BY AGE, SEX, AND RACE OF PATIENTS. (Eng.) Krolls, S. O. (CMR no. 8, Box 9322, Lackland Air Force Base, TX 78236); Hoffman, S. *J Am Dent Assoc* 92(3): 571-574; 1976.

Data were compiled to study squamous cell carcinoma of the oral soft tissues. A trend for this disease to involve younger people became evident; since 1970, in all locations but the lower lip ar the buccal mucosa, the largest number of carcinom occurred in patients a decade earlier than in patients whose conditions were diagnosed before 1970. In cases involving the lower lip, a greater change was observed; the highest number of patients was 20 yr younger (in the fifth decade of life). Squamous cell carcinoma of the buccal mucosa, however, did not show this tendency. Oral cancers in children are extremely rare. The most common location of oral cancer in this study was the lower lip. There was an increase in the percentage of cancers that developed in the floor of the mouth. There is a continuous yearly increase in the number of oral cancers; the danger of overlooking the early stages of oral cancer was stressed.

494 INCREASING INCIDENCE OF LEUKEMIA IN INFANCY AND CHILDHOOD: A REAL CHALLENGE. Eng.) Pratap, V. K. (L.L.R.M. Medical Coll., eerut, India); Singh, S. N.; Jain, P. C.; Singh, . *Indian Pediatr* 12(8): 653-657; 1975.

hirty-seven cases of leukemia in children under 5 yr were examined between 1969 and 1974 in one ndian hospital. These constituted 0.3% of all ospital admissions during this period. Eighty-six ercent of the cases were acute leukemia. Most atients were 5-9 yr old, and the male to female atio was 3.1:1. The main presenting symptoms were alaise, pallor, hepatomegaly, splenomegaly, fever, eight loss, and anorexia. Only five patients howed remission and were alive, with treatment, or one year after onset. The average survival eriod was six weeks.

495 DEVELOPMENT OF CNS LEUKAEMIA IN ACUTE MYELOID LEUKAEMIA IN CHILDHOOD. (Eng.) ay, H. E. M. (Royal Marsden Hosp., Fulham Road, ondon SW3 6JJ, U.K.). *Arch Dis Child* 51(1): 73-4; 1976.

n 130 cases of acute myeloid leukemia in children elow the age of 14 yr in Great Britain, there ere 21 cases in which the CNS was involved. The ncidence and timing were similar to that of acute mphoblastic leukemia; in 12 patients who received ophylactic treatment, involvement of the CNS was evented.

96 NASOPHARYNGEAL CANCER IN BERMUDA. (Eng.) Brown, T. M., Jr. (Public Health rvice, U.S. Dept. Health, Education, Welfare, lanta, GA); Heath, C. W., Jr.; Lang, R. M.; Lee, K.; Whalley, B. W. *Cancer* 37(3): 1464-1468; 76.

x cases of nasopharyngeal carcinoma (NPC) were agnosed in residents of Bermuda in the seven ar period 1966-1972. While epidemiologic study vealed no history of common environmental expores, two of the six cases occurred in adult sibs om a family in which a third adult sib developed C in 1963. These three cases were from a large, ssibly in-bred Portuguese family with origins in e Azores Islands. The remaining four cases were l in black children ages 10-15; two of these ur were first cousins. These observations suggest that genetic influence may contribute to the etiology of NPC.

0497 URINARY AETIOCHOLANOLONE IN PATIENTS WITH EARLY BREAST CANCER FROM SOUTH EAST SCOTLAND AND SOUTH WALES. (Eng.) Miller, W. R. (Dept. Clinical Surgery, Univ. Edinburgh, Edinburgh, Scotland); Hamilton, T.; Champion, H. R.; Wallace, I. W. J.; Forrest, A. P. M.; Prescott, R. J.; Cameron, E. H. D.; Griffiths, K. *Br J Cancer* 32(5): 619-627; 1975.

Urinary etiocholanolone levels were measured in 417 women aged between 20 and 70 yr. The women were patients from South East Scotland and South Wales with either benign or malignant disease of the breast and normal controls. The pattern of etiocholanolone excretion with respect to age and menopausal status was defined in each group of patients. No significant differences in urinary levels were detected between patients with breast disease, benign or malignant, and control patients. More detailed examination of the 201 women with early cancer of the breast showed that there is no consistent correlation between pre-operative etiocholanolone levels and factors of prognostic significance detectable at the time of primary treatment--tumor size, grade, round cell infiltration, histological involvement of nodes by tumor and the clinical palpability of lymph nodes. The results suggest that the prognostic value of pre-operative etiocholanolone measurements is somewhat limited in patients with early breast cancer. Low levels of etiocholanolone were associated with post-menopausal patients, a group in which the prognosis is generally poorer than that in pre-menopausal women.

0498 MELANOMAS OF THE EYE AND OTHER NONCUTANEOUS SITES: EPIDEMIOLOGIC ASPECTS. (Eng.) Scotto, J. (Natl Cancer Inst., Bethesda, MD 20014); Fraumeni, J. F.; Lee, J. A. H. *J Natl Cancer Inst* 56(3): 489-491; 1976.

Data from the Third National Cancer Survey, 1969-1971, were used in an epidemiological study of noncutaneous melanomas, particularly of the eye. Noncutaneous melanoma originated in the eye in 79% of 432 patients. As with skin melanoma, ocular tumors were more common in whites than blacks and predominated in females at younger ages and males after middle life. However, ocular melanoma did not show the strong North-South gradient seen with skin melanoma; this suggested that there is no relation to sunlight exposure.

0499 STATISTICAL ANALYSIS OF CYTOPHOTOMETRIC DNA MEASUREMENTS DEMONSTRATED ON MALIGNANT TESTICULAR TERATOMA (Letter to Editor). (Eng.) Lederer, B. (Inst. Pathology, Univ. Innsbruck, Austria); Autengruber, M.; Mikuz, G. *J Clin Cytol* 20(1): 5-6; 1976.

The use of easy and convenient statistical procedures (calculation of mean values and variation coefficient of the DNA content of the tumor cell nuclei) was applied to the characterization of malignant testicular teratoma. A malignant anaplastic teratoma, a malignant teratoma intermediary type A, and a malignant teratoma intermediary type B were studied. A discrimination between the anaplastic teratoma and the teratoma intermediary type B was possible by comparing the standard deviations that did not have overlapping confidence limits.

0500 MALIGNANT NEOPLASTIC LESIONS IN BANGLADESH (AN ANALYSIS OF 2064 CASES). (Eng.) Rahim, M. A. (Medical Coll. Hosp., Dacca, Bangladesh). *Bangladesh Med Res Counc Bull* 1(2): 85-89; 1975.

0501 AN EPIDEMIOLOGIC STUDY OF OSTEOGENIC SARCOMA IN MALAYSIA. INCIDENCE IN URBAN AS COMPARED WITH RURAL ENVIRONMENTS AND IN EACH OF THREE SEPARATE RACIAL GROUPS, 1969-1972. (Eng.) Bovill, E. G., Jr. (Dept. Orthopaedic Surgery, Univ. California, San Francisco, CA); Silva, J. F.; Subramanian, N. *Clin Orthop* 113: 119-127; 1975.

0502 EPIDEMIOLOGY OF CHILDHOOD LEUKAEMIA IN GREATER LONDON: A SEARCH FOR EVIDENCE OF TRANSMISSION ASSUMING A POSSIBLY LONG LATENT PERIOD. (Eng.) Smith, P. G. (DHSS Cancer Epidemiology and Clinical Trials Unit, Oxford Univ., 9 Keble Rd., Oxford, England); Pike, M. C.; Till, M. M.; Hardisty, R. M. *Br J Cancer* 33(1): 1-8; 1976.

0503 CONFIRMATION OF VINYL CHLORIDE IN FOODS BY CONVERSION TO 1-CHLORO-1,2-DIBROMOETHANE. (Eng.) Williams, D. T. (Bureau of Chemical Safety, Health Protection Branch, Ottawa, Ontario, Canada K1A 0L2). *J Assoc Off Anal Chem* 59(1): 32-24; 1976.

0504 MORTALITY AMONG RUBBER WORKERS. II. OTHER EMPLOYEES. (Eng.) Monson, R. R. (Harvard Sch. Public Health, 677 Huntington Ave., Boston, MA 02115); Nakano, K. K. *Am J Epidemiol* 103(3): 297-303; 1976.

0505 MORTALITY AMONG RUBBER WORKERS. I. WHITE MALE UNION EMPLOYEES IN AKRON, OHIO. (Eng.) Monson, R. R. (Harvard Sch. Public Health, 677 Huntington Ave., Boston, MA 02115); Nakano, K. K. *Am J Epidemiol* 103(3): 284-296; 1976.

See also:

* (Rev): 0002, 0005, 0007, 0023, 0024
* (Chem): 0066, 0073, 0080, 0086, 0087, 0089,
0091, 0097, 0110, 0118, 0119, 0127
* (Phys): 0131, 0133, 0134
* (Viral): 0205
* (Immun): 0259, 0260
* (Path): 0389, 0469, 0470

0506 FOETAL THYMIDINE KINASE IN TUMOURS AND COLONIC FLAT MUCOSA OF MAN.

(Eng.) Salser, J. S. (Memorial Sloan-Kettering Cancer Center, New York, NY 10021); Balis, M. E. *Nature* 260(5548): 261-263; 1976.

Two forms of deoxythymidine kinase (TK) were characterized using antisera prepared against the enzyme partially purified from human colonic mucosa. Antisera were prepared in the rabbit, using partially purified TK from total normal colonic mucosa as immunizing antigen, and screened by Ouchterlony double diffusion technique against cytosol (127,000 x g supernatant fraction) TKs from normal total colon, colonic surface and crypt cells, placenta, phytohemagglutinin (PHA)-stimulated lymphocytes, leukemic cells, and tumors from sites other than the colon. Antisera, which markedly inhibited homologous colonic TK, were much less effective in neutralizing the activity of enzymes from colonic adenocarcinoma, placenta, and ovarian carcinoma and did not inhibit the enzyme from either PHA-stimulated lymphocytes or myeloblastic leukemic WBC. There were cross reactions between colonic TK and heterologous enzymes from placenta and colonic tumors, osteogenic sarcoma (lung) and placenta, rectal carcinoma and colonic polyp, and total mucosa from small intestines, suggesting partial antigenic identity of the enzymes in these preparations. The data suggest that TK of colonic tumor is serologically more similar to the enzyme from surface cells than that from lower crypt cells. This is consistent with the hypothesis that colonic tumors arise from surface epithelial cells rather than from the depths of the crypts.

0507 KINETIC PROPERTIES OF PYRUVATE KINASE ISOLATED FROM RAT HEPATIC TUMORS.

(Eng.) Irving, M. G. (Prince of Wales Hosp., Randwick, N.S.W. 2031, Australia); Williams, J. F. *Biochem Biophys Res Commun* 68(1): 284-291; 1976.

The kinetic properties of two forms of pyruvate kinase isolated from hepatic tumors induced in male Wistar rats administered N-nitrosodiethylamine (50 mg/l for 16 wk in the drinking water) are described. Hepatic tumors were dissected from noninvolved liver and freed of necrotic tissue before the preparation of the tumor homogenate. L and M forms of pyruvate kinase were isolated, with the L form showing a 320-fold increase in specific activity following DEAE-cellulose and Sephadex G-200 chromatography. Loss of the L enzyme activity was minimized by the addition of sucrose (0.25 M) and dithiothreitol (0.25 M) to all buffer solutions. MgADP-/ADP^{2-} of 20:1 gave optimum activity for both the intrinsic and fructose-1,6-diphosphate (fl,6diP)-stimulated reactions. There was a marked difference in the kinetic response of the L-form of rat liver tumor enzyme to increasing concentrations of phosphoenolpyruvate (PEP) in comparison with the kinetic properties of the L form isolated from normal rat liver, suggesting that the tumor enzyme has an increased capacity to catabolize PEP. The M fraction sedimented in the 45 to 65% saturated $(NH_4)_2SO_4$ fractions and did not absorb to DEAE-cellulose until the pH was raised to 8.5. This fraction exhibited Michaelis-Menten kinetics with PEP as the variable substrate. For both L and M forms of rat liver tumor enzyme, at a constant PEP concentration (0.25 mM), the maximum activity occurred at pH 6.5. ATP did not inhibit the L form of the enzyme. Alanine (2.5 mM) caused 60% inhibition at low PEP concentrations (0.25 mM). The homotropic effector, PEP, exhibited a complex allosteric pattern. Saturation kinetics were not observed for either the intrinsic or fl,6diP-stimulated reactions with PEP concentrations as high as 10 mM. The authors conclude that the kinetic properties of rat liver tumor enzyme are consistent with those of a new isozyme that has increased capacity to catabolize PEP, and is not as sensitive to regulation of its activity by changes in the concentration of effectors.

0508 MODIFIED 5'-TERMINI IN SMALL NUCLEAR RNAs OF MOUSE MYELOMA CELLS.

(Eng.) Cory, S. (Walter and Eliza Hall Inst. Medical Res., P.O. Royal Melbourne Hosp., Victoria 3050, Australia); Adams, J. M. *Mol Biol Rep* 2(4): 287-294; 1976.

The nuclei of MPC 11 mouse myeloma cells contain several species of small RNA's related to those found in other mammalian cells. These include U1 RNA, about 190 nucleotides in length, and U2 RNA, about 170 nucleotides long. The 5'-termini of ^{32}P-labeled U1 and U2 RNA's have been investigated by a fingerprinting technique involving digestion with T2-ribonuclease. The RNA's were found to have modified 5'-terminal structures of the form m_3 G(5')ppp(5')AmpUmpAp for U1 RNA and m_3G(5')ppp (5')AmpUmpCp for U2 RNA, where m_3G is N^2,N^{2}7-trimethylguanosine and Am and Um are 2'-O-methylnucleosides. These 5'-terminal sequences are the same as those proposed for rat hepatoma U1 and U2 RNAs, but with triphosphate rather than diphosphate links. These 5'-termini are similar to the sequences of mRNA, suggesting that these RNA's are synthesized or proceed from precursors in the same manner as mRNA.

0509 BIOCHEMICAL PROPERTIES OF CYCLIC NUCLEOTIDE PHOSPHODIESTERASE IN METASTASIZING AND NONMETASTASIZING RAT MAMMARY CARCINOMAS.

(Eng.) Chatterjee, S. K. (Roswell Park Memorial Inst., N.Y. State Dept. Health, Buffalo, NY 14263); Kim*, U. *J Natl Cancer Inst* 56(1): 105-110; 1976.

The biochemical properties of cyclic nucleotide phosphodiesterases (cPDE) in a nonmetastasing and a spontaneously metastasizing rat mammary carcinoma were compared to investigate the differences in the biochemical properties between mammary tumor enzymes and the cPDE from other sources. The phosphodiesterases in both tumors had a pH optimum of around 8.0 and preferentially hydrolyzed cyclic purine nucleotides. The rate of hydrolysis of purine nucleotides in the nonmetastasizing tumor was two times higher than in the metastasizing tumor, but the rate of pyrimidine nucleotide hydrolysis was equal in both tumors. Theophylline, caffeine, and D,L-4-(3-butoxy-4-methoxybenzyl)-2-imidazolidinone inhibited the enzyme activity in both tumors; the percent inhibition was the same by each inhibitor. The cyclic nucleotide phosphodiesterase activity in either tumor was stimulated by Mg++, Mn++, and Co++, and suppressed by Ca++, Zn++, and Ni++. EDTA inhibited the activity below the basal level (activity in the absence of added cation); this inhibition could be recovered up to the basal level by an equimolar quantity of either Mn++ or Mg++. Further stimulation of the enzyme activity with increasing concentrations of divalent cations was observed only with Mn++. Similar effects were observed with ethylene glycol bis(beta-aminoethyl ether)-N,N-tetraacetic acid. The stimulatory cations affected both the low and high Michaelis constant (Km) enzymes in these tumors by increasing the maximum velocity. In the low Km enzyme, the Km was also slightly increased. Neither guanosine 3',5'-cyclic monophosphate nor adenosine 3',5'-cyclic monophosphate had any effect on the hydrolysis of the other at physiologic levels. The authors suggest that the ability to modulate the cPDE activity in cells may permit the alteration of biologic properties of tumor cells, such as immunogenicity, antigen-shedding property, and metastasizing capacity.

0510 PURIFICATION, ANALYSIS, AND SUBUNITS OF MYELOMA (MOPC 21) DNA-DEPENDENT RNA POLYMERASE A(I) BY POLYRIBOADENYLATE-SEPHAROSE. (Eng.) Hall, S. H. (Natl. Inst. Health, Bethesda, MD 20014); Smuckler, E. A. *Cancer Res* 36(3): 1094-1100; 1976.

DNA-dependent RNA polymerase A (or I) was purified from murine myeloma MOPC 21 by diethylaminoethyl Sephadex chromatography. Further separation from DNA polymerases, protein kinase, and DNA endonuclease was accomplished by polyriboadenylate-Sepharose affinity chromatography followed by gradient centrifugation. Yields following chromatography were 100%, but following gradient centrifugation only 25-30% of the activity remained. Addition of low molecular weight components increased yields to 50-60%. Several species of myeloma polymerase A could be detected, and subunits of 190,000 and 125,000 daltons were identified. No evidence of phosphorylation of the polymerase was found.

0511 THE ALKALINE PHOSPHATASES OF HUMAN LIVER: AN IMMUNOCHEMICAL STUDY. (Eng.) Korngold, L. (Cornell Medical Coll., New York, NY). *Int Arch Allergy Appl Immunol* 50(3): 297-308; 1976.

Four out of 18 human liver alkaline phosphatase (AP) preparations reacted with anti-liver and anti-intestinal AP. The liver AP that reacted with anti-intestinal AP, designated as intestine-like AP, was precipitated at 50% ammonium sulfate whereas the major liver AP precipitated at 66% saturation. Gel filtration showed that liver AP, intestine-like AP and intestinal AP contained AP with apparent molecular weights of 130,000 daltons; the intestine-like AP contained a second but smaller component of 70,000-80,000 daltons. AP extracted from intestine also contained this smaller component; its electrophoretic mobility was that of an α_2-globulin, whereas that of the intestine-like AP had a mobility of β-globulin. The similarity of the intestine-like AP to the AP variant found in hepatomas was stressed.

0512 MEMBRANE PHOSPHATASE ACTIVITY IN SOMATIC CELL HYBRIDS. (Eng.) Tisdale, M. J. (Saint Thomas's Hosp. Medical Sch., London SE1 7EH, England); Phillips, B. J. *Biochem Biophys Res Commun* 68(1): 35-42; 1976.

The dephosphorylation of membrane proteins by an endogenous phosphatase was studied in A9 and TLX5 cells and in hybrids between them. These cells differed both in growth rate and saturation density achieved in vitro. The activity of the phosphatase paralleled the growth rate of these cell lines. It is considered that this phosphatase is part of an ATPase enzyme system. The enzyme from TLX5 cells was stimulated by cyclic AMP and inhibited by zinc and fluoride ions. Prostaglandin E_1 had no effect on the activity of the phosphatase.

0513 MODIFICATIONS OF PURIFIED GLUCOSE-6-PHOSPHATE DEHYDROGENASE AND OTHER ENZYMES BY A FACTOR OF LOW MOLECULAR WEIGHT ABUNDANT IN SOME LEUKEMIC CELLS. (Eng.) Kahn, A. (Hopital Beaujon, 92110 Clichy, France); Boivin, P.; Rubinson, H.; Cottreau, D.; Marie, J.; Dreyfus, J. C. *Proc Natl Acad Sci USA* 73(1): 77-81; 1976.

The factors in human leukemic granulocyte extracts that can modify highly purified platelet glucose-6-phosphate dehydrogenase (G6PD), in its isoelectric point and its molecular specific activity were studied. The G6PD modifying factors had a molecular weight slightly under 5000 and were thermostable, dialyzable, and ultrafilterable. These molecules were destroyed by various endo- and exopeptidases and by serine enzymes present in crude extracts of leukocytes and commercial preparations of ribonuclease. The alterations of platelet G6PD due to the G6PD modifying factors were stable and not reversible by dialysis or further chromatography. The leukemic extracts could also modify the electrophoretic mobility and/or the enzymatic activity of purified leukocyte pyruvate kinase, 6-phosphogluconate dehydrogenase, and glucosephosphate isomerase.

0514 ORNITHINE DECARBOXYLASE ACTIVITY AND DNA SYNTHESIS IN MORRIS HEPATOMAS 5123-C AND 7800. (Eng.) Pariza, M. W. (McArdle Lab. Cancer Res., 450 North Randall Ave., Univ. Wisconsin, Madison, WI 53706); Yanagi, S.; Gurr, J. A.; Bushnell, D. E.; Morris, H. P.; Potter, V. R. *Life Sci* 18(1): 39-47; 1976.

The activities of ornithine decarboxylase (ODC) and thymidine kinase (TK) and the rates of DNA synthesis were determined in hepatomas and livers of rats bearing Morris hepatoma 5123-C or 7800 (sc, flank or gastrocnemius muscle) and entrained to a schedule of 12 hr of light followed by 12 hr of darkness, with food (60% protein) available only during the first 2 hr of the dark period. ODC activity in hepatoma 5123-C displayed a diurnal oscillation, increasing 2-fold during the feeding period and then rapidly decaying to 20% of the peak level. The livers of rats bearing hepatoma 5123-C exhibited a similar oscillation of ODC activity, with peak values lower than in the hepatomas but higher than in the livers of control (nontumor bearing) animals. TK activity and the rate of DNA synthesis in hepatoma 5123-C were low during most of the dark period but increased rapidly towards the end of the dark period. DNA synthesis reached a plateau at the dark-light interface and then rapidly declined, but TK activity remained high during the light period. Similar studies on hepatoma 7800 showed low levels of ODC activity throughout the day. Hepatoma 7800 diminished the normal diurnal oscillation of ODC activity. Tyrosine aminotransferase activity showed normal oscillation in hepatoma 7800 and in the livers of hosts. Incorporation of ^{3}H-thymidine into the DNA of hepatoma 7800 was constant; in hepatoma 5123-C incorporation was seen only during the dark-light interface.

515 METHYLATION OF RIBOSOMAL PROTEINS IN HELA CELLS. (Eng.) Chang, F. N. (Dept.
iology, Temple Univ., Philadelphia, PA 19122);
avickas, I. J.; Chang, C. N.; Dancis, B. M. *Arch*
iochem Biophys 172(2): 627-633; 1976.

he methylated amino acids derived from the pro-
eins of both the 40S and 60S cytoplasmic ribo-
omal subunits of HeLa cells have been charac-
erized by high-voltage paper electrophoresis. The
redominant methylated species in both subunits
as found to be NG,NG-dimethylarginine. ε-N-tri-
ethyllysine was also found in both subunits, but
he 60S subunit contained about three times more
f this species than did the 40S subunit. Little ε-
-monomethyllysine was detected in either subunit.
he preferential presence of ε-N-trimethyllysine
n the 60S subunit of HeLa ribosomes is consistent
ith the idea that it is necessary for the pep-
idyl transferase reaction, as has been suggested
o be the case for *Escherichia coli*.

516 ADENOSINE DEAMINASE ACTIVITY IN CHRONIC LYMPHOCYTIC LEUKEMIA. (Eng.) Tung, R.
New York Univ., Sch. Medicine, New York, NY
0016); Silber, R.; Quagliata, F.; Conklyn, M.;
ottesman, J.; Hirschhorn, R. *J Clin Invest* 57(3):
56-761; 1976.

he level, phenotypes, and isozyme distribution of
denosine deaminase (ADA) were determined in lympho-
ytes from patients with chronic lymphocytic leu-
emia (CLL). ADA activity was measured by the
onversion of adenosine to uric acid, determined
ectrophotometrically by the change in absorbance at 293 nm. The ADA level in lymphocytes from patients with untreated CLL was consistently lower than in lymphocytes from normal subjects. No significant differences were found in the phenotype or isozyme distribution. In untreated patients, the ADA level was inversely correlated with the lymphocyte count and the percentage of bursa-equivalent (B) cells. After therapy, a diminution in the lymphocyte count was associated with an increase of ADA activity towards normal levels. The ADA levels were slightly higher in the thymus-derived (T) than in the B lymphocytes from normal subjects. The B cells had lower activity than T cells in patients with CLL. They also had a lower activity than the B cells from normal subjects. The ADA level was 2.3-fold higher in T cells from patients with CLL than in normal T cells. The decrease in ADA levels is an anomaly that is reversible and appears to be a reflection of the proliferation of abnormal B cells in this disorder.

0517 THE UNIQUE IDENTITY OF RAT HEPATOMA PHENYLALANINE HYDROXYLASE. (Eng.) Tourian, A. (Duke Univ. Medical Center, Durham, NC 27710). *Biochem Biophys Res Commun* 68(1): 51-55; 1976.

The identity and number of rat hepatoma H4-II-E-C3 culture isozymes were determined with respect to those of rat liver. H4-II-E-C3 culture phenylalanine hydroxylase was found to differ from any of the three isozymes of liver or the one of kidney. Isoelectric focusing resulted in a single isozyme with an isoelectric point of 5.20 compared to 5.20, 5.30, 5.60 for the liver and 5.35 for the kidney. Hepatoma phenylalanine hydroxylase cross-reacted with antibody number 2 of rat liver but differed from isozyme number 2 by a 10-fold difference in the ratio of antigen to antibody at equivalence on immunotitration. Kidney phenylalanine hydroxylase, which also cross reacted with antibody number 2 of liver, could quantitatively (at 2 mU per mg immunoglobulin) absorb antibody against hepatoma enzyme, liver isozyme number 2 and itself without having any effect on antibody number 1 and number 3 of liver.

0518 COPRODUCTION OF REGAN ISOENZYME AND CARCINOEMBRYONIC ANTIGEN IN HCT-8 CELLS. (Eng.) Singer, R. M. (Tufts Univ. Medical Sch., Boston, MA 02111); Tompkins, W. A. F.; White, L. J.; Perry, J. E. *J Natl Cancer Inst* 56(1): 175-176; 1976.

The presence of the Regan isoenzyme of alkaline phosphatase was demonstrated in the carcinoembryonic antigen (CEA)-producing human cell line HCT-8. Biochemical, histochemical, immunologic, and electrophoretic methods were used as criteria for the identification and characterization of this isoenzyme. The coproduction of CEA and the Regan isoenzyme may represent the coexpression in the same cell of two sets of genes, one equivalent to the phase of fetal intestinal development in which CEA genes are "turned on," and the other representing activated trophoblastic genes that code for term placental alkaline phosphatase. These observations are analogous to the phenomenon of coexpression of carcinofetal (CEA) and carcinoplacental (Regan isoenzyme, Human Chorionic Gonadotropin) phenotypes in human tumors previously reported.

0519 TRANSCRIPTION OF CHROMATIN FROM MOUSE FIBROBLASTS. (Eng.) Reiss, C. (Institut du Radium, Orsay, France); Crepin, M.; Paulin, D.; Gros*, F. *Biochimie* 57(11/12): 1307-1313; 1975.

Chromatin purified from mouse fibroblasts was fractionated after shearing by sedimentation in a sucrose gradient into an extended ''light'' and a compact ''heavy'' component. Further purification of these classically described components was achieved by a second cycle of centrifugation of the light and heavy components through an equilibrium density gradient of metrizamide. The light component purified from sucrose gradient sediments faster (peak I) on metrizamide than its heavy counterpart (peak II). Template activity for DNA directed RNA synthesis in the presence of *Escherichia coli* RNA polymerase was negligible in peak II but very pronounced in the peak I fraction. The difference in template activity appeared to be connected with differences in propagation rather than initiation rates. Comparison of gel electrophoresis patterns of proteins indicated that the active subcomponent includes high molecular weight components not present in the inactive one, but that its histone content is somewhat lower. Using a very highly sensitive automatic recording apparatus for the measurement of melting profiles, no clear cut difference was observed in the behavior of active and inactive chromatin subcomponents nor in that of their total DNA.

0520 POLYAMINE METABOLISM, RNA SYNTHESIS, AND PROLIFERATION IN DENSITY-INHIBITED 3T3 CELLS. (Eng.) Clark, J. L. (Coll. Medicine, Univ. California, Irvine, CA 92717); Duffy, P. *Arch Biochem Biophys* 172(2): 551-557; 1976.

Density-inhibited cultures of 3T3 cells were stimulated with calf serum or with one of 11 other agents reported to cause cells in culture to divide. In agreement with previous studies, activation of polyamine synthesis and cell number increase showed a similar dose-response to calf serum. In contrast, when the results from all agents were considered together, increases in ornithine decarboxylase activity and putrescine and spermidine concentrations correlated poorly with the stimulation of DNA synthesis and proliferation. However, the increases in polyamine parameters correlated highly with the stimulation of ribosomal RNA synthesis by both serum and the other agents. These latter results are consistent with previous evidence of a temporal relationship between polyamine and RNA concentrations and synthesis. Increases in polyamine synthesis were not sufficient to cause cell division in resting 3T3 cells, a result similar to previous observations with rat tissues. Also, results with glucocorticoids demonstrate that induction of cell division in resting 3T3 cells does not require activation of either polyamine or RNA synthesis.

0521 IDENTIFICATION OF N-TERMINAL METHIONINE IN THE PRECURSOR OF IMMUNOGLOBULIN LIGHT CHAIN: INITIATION OF TRANSLATION OF MESSENGER RIBONUCLEIC ACID IN PLANTS AND ANIMALS. (Eng.) Schechter, I. (Dept. Chemical Immunology, Weitzmann Inst. Science, Rehovot, Israel); Burstein, Y. *Biochem J* 153(3): 543-550; 1976.

The proteins programmed in the wheat-germ cell-free system by the mRNA coding for the MOPC-321 mouse myeloma L (light) chain were labeled with [^{32}S]methionine, [3-^{3}H]leucine or [3-^{3}H]serine, and were subjected to amino acid-sequence analyses. Over 95% of the total cell-free product was sequenced as one homogeneous protein, which corresponded to the precursor of the L-chain protein. This extra piece contained one methionine residue at the N-terminus, one serine residue at position 18, and six leucine residues, which are clustered in two triplets at positions 6, 7, 8 and 11, 12, 13. The identification of methionine at the N-terminus of the precursor was in agreement with the evidence showing that unblocked methionine is the initiator residue for protein synthesis in eukaryotes. The absence of methionine at position 20, which preceded the N-terminal residue of the mature protein, suggested that myeloma cells synthesize the precursor. However, within the cell the precursor should be rapidly processed to the mature L chain, since precursor molecules have not yet been found in the intact animal. The abundance (30%) of leucine residues indicated that the extra piece moiety is quite hydrophobic. The extra piece of the MOPC-321 L-chain precursor synthesized with the aid of the Krebs II ascites cell-free system was of identical size and had the same leucine sequence. This indicates that cell-free systems derived from the plant and animal kingdom initiate mRNA translation from the same point. The amino acid sequence of minute amounts of a highly labele protein (0.1 pmol) could be faithfully determined in the presence of a large excess (over 2 x 10^{6}-fold) of unrelated non-radioactive proteins.

0522 A REPRESSIBLE DNA-REPAIR SYSTEM IN MOUS NEUROBLASTOMA CELLS. (Eng.) McCombe, P.; Kidson, C. In: *Molecular Mechanisms for Repair of DNA*. Edited by P. C. Hanawalt; R. B. Setlow. (New York: Plenum Press): 813-815; 1974.

Because mouse neuroblastoma cells (cloned from CC 131-neuro 2a) in serum free medium assume a differentiated state similar to nondividing neurons, they were used to study DNA repair mechanisms in terminally differentiated nerve cells. After UV damage, differentiated cells, as compared to proliferating cells, showed reduced survival. Differentiated cells had very low agar clone surviva in the presence of serum at UV doses where prolif

erating cells had a cloning efficiency like that
of unirradiated cells. Returning serum to differen-
iated cells caused them to enter S phase, followed
y cell mitosis. Normal UV resistance did not
reappear until the next G_1 phase. Adding serum at
4 hr after irradiation increased the clone sur-
ival of differentiated cells. Neuroblast dif-
erentiation seems linked with reversible repres-
ion of a DNA repair function, capable of induc-
ion on cell proliferation but not by UV light.
ata suggest the existence of a limited excision
ystem in both proliferating and differentiated
ells. Excision-repair alone can not ensure sur-
ival after low UV doses; both proliferating and
ifferentiated cells formed an equivalent number
f dimers, implying that excision is restricted by
ther factors, not dimer number. The function lost
fter differentiation seems to be a postreplication
epair system, so that when DNA replication is
timulated after UV irradiation, the cells cannot
epair or override dimers. The system appears to
e induced by signals programmed in the next G_1
hase.

523 RELATIONSHIP BETWEEN DNA REPAIR CAPACITY AND CELLULAR AGING. (Eng.) Little, J. B.
Harvard Univ. Sch. Public Health, Boston, MA
2115). *Gerontology* 22(1/2): 28-55; 1976.

he experimental evidence is reviewed for the
heory that aging in mammalian cells is related to
decline in the efficiency of normal DNA repair
rocesses. Fragmentary data suggest that there is
n age-associated decline in the capacity of cells
o perform at least certain types of repair, but
t is not known if this is causal or contributory
o aging. This is particularly noticeable in human
iploid cells as they reach terminal senescence in
itro.

24 DIFFERENT COMPOSITION AND MITOTIC ACTIVITY OF THE HAEMOPOIETIC TISSUE IN
NE MARROW, SPLEEN AND LIVER IN CHRONIC MYELOID
UKAEMIA. (Eng.) Sjoegren, U. (Univ. Hosp., Lund,
eden); Brandt, L. *Acta Haematol* 55(2): 73-80;
76.

pirates from bone marrow, spleen and liver were
alyzed in 15 untreated patients with chronic
eloid leukemia (CML). The proportion of erythro-
asts was higher in the spleen and liver than in
e bone marrow. An increased frequency of baso-
ilic leucocytes was recorded in the extramedul-
ry sites compared to the bone marrow. In the
ver aspirates a considerable admixture of lympho-
tes was found. The mitotic indices of the gran-
opoietic and erythropoietic precursor cells were
wer in the spleen and liver than in the bone
rrow. The results indicate that the composition
d proliferative activity of the hemopoietic
ssue differ in bone marrow and extramedullary
tes in CML. The discrepancies may be due to
fferences in the microenvironment for the haemo-
ietic cells or to a selective accumulation of cells with a low mitotic activity in extramedullary sites.

0525 REPAIR DEFICIENCY AND GENETIC COMPLEMENTARITY OF FIBROBLAST CELLS IN CULTURE FROM SIX XERODERMA PIGMENTOSUM PATIENTS. (Eng.) Huang, P. C.; Vincent, R.; Jr. In: Molecular Mechanisms for Repair of DNA. Edited by P. C. Hanawalt; R. B. Setlow. (New York: Plenum Press): 729-733; 1974.

Cultured cells from patients with genetic disease xeroderma pigmentosum (XP) were examined for DNA repair rates and complementation. The five or six distinct genetic groups of this mutation could be assigned to four complementation groups by measuring the appearance of DNA repair in heterodikaryons, as compared to that in corresponding homodikaryons. Repair rates were assayed by unscheduled DNA synthesis, using autoradiography. All XP cell strains tested were (at least for late passages) severely deficient in DNA repair.

0526 INCREASED DNA EXCISION-REPAIR AS PATHOGENESIS OF A HUMAN LEUKEMIA. (Eng.) Huang, A. T.-F. In: Molecular Mechanisms for Repair of DNA. Edited by P. C. Hanawalt; R. B. Setlow. (New York: Plenum Press): 805-806; 1974.

The increased cell mass seen in chronic lymphocytic leukemia (CLL) was studied by in vitro examination of CLL cells to compare their survival with normal cells. CLL cells show a greater capacity to repair DNA damage (induced by UV irradiation or x-rays); after irradiation CLL cells incorporate more ^{3}H-thymidine into DNA, excise pyrimidine dimers faster and more thoroughly, and rejoin x-ray induced strand breaks more rapidly. CLL cells survive UV irradiation in vitro better than normal cells. Irradiation with UV, followed by a two hour pulse chase exposure to tritiated thymidine, and measurement of the precipitable label per culture, showed that leukemic cells were more stable than normal cells for this criterion. It is suggested that cells that have a greater capacity for preserving the integrity of their DNA may have an advantage over other cell types. CLL cells seem to survive longer than the normal lymphocyte.

0527 UNEVEN EXTRACTION OF PROTEIN IN CHINESE HAMSTER CHROMOSOMES DURING G-STAINING PROCEDURES. (Eng.) Matsukuma, S. (Cancer Inst., Toshima-ku, Tokyo 170, Japan); Utakoji, T. *Exp Cell Res* 97(2): 297-303; 1976.

To elucidate the role of chromosomal protein in G-band production, changes of protein distribution in chromosomes were studied in situ at each step of Giemsa (G)-staining procedures. As a highly specific stain for protein, 1-dimethylaminonaphthalene-5-sulphonyl chloride (dansyl Cl) was used, which conjugated with amino groups in polypeptide to emit bright fluorescence under UV irradiation, so that the pattern of fluorescence of dansyl-stained chromosomes was expected to reflect the distribution of protein. Uniform fluorescence pattern observed in untreated, dansyl-stained chromosomes indicated even distribution of protein in the ordinary air-dried chromosomes. The pattern of fluorescence representing the distribution of chromosomal protein after pretreatments of G-staining showed brighter outlines of chromatids, reduced fluorescence of chromosome body, and a slight difference in intensity along chromosome arms which corresponded to G-bands. This correspondence was confirmed when Giemsa stain was removed from G-banded chromosomes and the chromosomes were stained with dansyl Cl. The resulting dim fluorescence pattern conformed to G-bands previously observed in the same chromosomes. Similar events were observed in HCl-extracted chromosome slides, although the fluorescence was considerably reduced in this case. These results suggest that chromosomal protein was partially lost during pretreatments of G-staining, that acid-soluble protein assumed a less significant role in the G-staining mechanism, and that uneven deprivation of acid-insoluble protein may occur during G-staining procedures.

0528 ARREST OF 3T3 CELLS IN G1 PHASE IN SUSPENSION CULTURE.

(Eng.) Otsuka, H. (Dept. Biological Sciences, Purdue Univ., West Lafayette, Indiana 47907); Moskowitz, M. *J Cell Physiol* 87(2): 213-220; 1976.

The growth characteristics of 3T3 cells in monolayer and suspension cultures were investigated and compared with those of Py3T3, 3T3/41, and BHK21 cells. 3T3 cells did not grow in Methocel suspension culture, while the other permanent cell lines did. The viability of 3T3 cells in suspension remained unchanged for at least three days with respect to plating efficiency, vital staining and resumption of normal growth when transferred into monolayer culture. When monolayer 3T3 cells in G1 phase were suspended, they remained in G1 phase. Cells already in S phase that were suspended completed ongoing DNA synthesis and mitosis and then were arrested in the G1 phase. Progress through the cell cycle was reinitiated after suspended cells attached to a surface. When monolayer cells in late G1 phase (just before entering S phase) were put in suspension cultures, they did not initiate DNA synthesis. The authors speculate that 3T3 cells more closely resemble cells in adult tissues than do embryonic cells and therefore may be considered more ''normal'' with respect to studies on tumorigenesis.

0529 UPTAKE OF AMINO ACIDS AND THYMIDINE DURING THE FIRST CELL CYCLE OF SYNCHRONIZED HAMSTER CELLS.

(Eng.) Bhargava, P. M. (Regional Res. Lab., Hyderabad 500009, India); Allin, E. P.; Montagnier, L. *J Membr Biol* 26(1): 1-7; 1976.

The net total uptake of four amino acids (valine, leucine, lysine and methionine) used at concentrations required for growth, and of thymidine at tracer concentrations, was studied during the first cell cycle of an asparagine-dependent strain of transformed BHK cells synchronized by asparagine starvation. The rate of the total uptake of the amino acids, the free pool of the amino acids taken up, and the rate of their incorporation into protein at the end of the first cell cycle were, on an average, 12-fold that at the beginning of the cell cycle. The increase in these parameters during the cell cycle was not linear. The uptake of thymidine started before the onset of DNA synthesis and proceeded linearly beyond the peak of the S phase. The rate of accumulation of thymidine into the acid-soluble fraction also increased during the S phase, apart from a tendency to plateau off at the peak of this phase. It reached a second plateau towards the end of the cell cycle, and then declined slightly. Evidence suggested that the total quantity of protein synthesized during the cell cycle is more than the newly synthesized protein present in the cells at the end of the cell cycle; this indicates degradation and/or secretion of a substantial proportion of the newly synthesized protein. The total protein synthesized at different time points in the cell cycle appeared to contain different proportions of the amino acids used.

0530 FORMATION OF BUNDLES OF MICROFILAMENTS DURING SPREADING OF FIBROBLASTS ON THE SUBSTRATE.

(Eng.) Bragina, E. E. (Acad. Medical Sciences USSR, Moscow M-478, USSR); Vasiliev, Y. M.; Gelfand, I. M. *Exp Cell Res* 97(2): 241-248; 1976.

Electron microscopy was used to study the sites of formation of bundles of parallel microfilaments in the early stages of spreading of normal mouse embryo (A strain) fibroblasts on the substrate. Bundles of microfilaments were not found in suspended cells. Contact of the surface of spherical cells with the substrate was not sufficient for the formation of bundles; these bundles were not seen near the under surface of cells that were already attached to the substrate but had not yet developed cytoplasmic outgrowths at their periphery. Peripheral cytoplasmic outgrowths (microspike and lamellar processes) attached to the substrate were found to be the only sites of localization of the first bundles of microfilaments seen in the spreading cells. It was suggested that surface and/or cytoplasm of the newly-formed peripheral cytoplasmic outgrowth may have some special properties necessary for the initiation of the develo ment of microfilament bundles.

0531 CELL DIVISION AND TISSUE REPAIR FOLLOWIN LOCALIZED DAMAGE TO THE MAMMALIAN LUNG.

(Eng.) Simnett, J. D. (Dept. Pathology, Univ. Newcastle upon Tyne, Newcastle upon Tyne, NE1 4LP, England); Fisher, J. M. *J Morphol* 148(2): 1770184; 1976.

The reparative reaction of A2G female mouse lung that occurs in response to local wounding is described. Small local wounds on the surface of the mouse lung, produced by cauterization, healed by a typical reparative process involving cell migration and increased cell division in alveolar and bronchial tissues. The local cell division response closely resembled the compensatory cell division response in the same organ which follows unilateral pneumonectomy or unilateral collapse of the lung: initially there was an increase in the rate of DNA synthesis followed by an increased rate of entry into mitosis, both of these functions returning to normal levels within a few days. The magnitude of the cell division response was much greater in bronchial than in alveolar tissue, a result which is consistent with the view that new alveolar tissue may be produced by the proliferation and differentiation of bronchial cells. The authors suggest that both types of response are governed by a single regulatory mechanism. The results do not support the view that the rate of cell division is regulated by systemically-circulating mitotic control factors and it is proposed that changes in the cell division rate, both in the reparative and in the compensatory types of response, are determined by local alterations in the concentration of regulatory metabolites.

0532 A METHOD FOR CLONING PLASMACYTOMA CELLS BY ATTACHMENT TO HISTONE-COATED PLASTIC SURFACES. (Eng.) Keay, L. (Washington Univ. Sch. Medicine, St. Louis, MO 63110). *Tissue Culture Assoc. Manual* 1(3): 177-180; 1975.

A method for cloning mouse plasmacytoma cells (MOPC 315 or J558) by attachment to histone-coated plastic surfaces, even in the presence of serum, is described. Plasmacytoma cells growing in plastic flasks were collected by centrifugation, resuspended in fresh medium supplemented with serum, dispersed by repeated pipetting, and then counted. Microtest II plates were histone-coated by allowing 0.2 ml sterile histone solution to remain in each well of a covered plate, at room temperature, overnight. A sample of the cells plus medium and serum was diluted to a density of 5 cells/ml, and a 0.2 ml aliquot of the cell suspension was added to each histone-treated well of the test plate, using the sterile Cornwall repeating syringe and wide cannula. The covered plate was then incubated at 37 C in a humidified CO_2 incubator. Colonies eveloped rapidly and were sufficiently large, by 0 to 14 days, for subculturing. The advantages of his method are that (1) suspension growth cells ecome surface-attached, facilitating observation nd counting; (2) colony formation is more acurately observed; (3) refeeding can be carried ut without cell loss and the necessity for many mall-scale centrifugations; and (4) the attached olony can be subcultured back to the normal susension growth system. The authors conclude that his cloning method may be useful for cloning other suspension growth cells provided that: (1) he cells attach firmly to permit refeeding and bservation; (2) the histone film is noncytotoxic; 3) the cells multiply to form a colony; and (4) the cells can be subcultured by trypsinization or mechanical dislodgement with the cells returning to normal suspension growth form.

0533 SURFACE PROTEINS AND FIBRINOLYTIC ACTIVITY OF CULTURED MAMMALIAN CELLS. (Eng.) Pearlstein, E. (Imperial Cancer Research Fund, Lincoln's Inn Fields, London WC2A 3PX, England); Hynes, R. O.; Franks, L. M.; Hemmings, V. J. *Cancer Res* 36(4): 1475-1480; 1976.

Surface proteins and fibrinolysis were investigated in a variety of cell types, including primary explants from man, calf, and rat, and cell lines from these species as well as from mouse and hamster. A large external transformation-sensitive protein was demonstrated by lactoperoxidase-catalyzed iodination. Electron microscope autoradiography confirmed that the technique labeled surface material only. The protein was present in explants of normal tissues and in non-tumor-producing cultured cell lines. It was not lost during long-term culture. Neoplastic transformation in vitro, whether spontaneous or induced by a chemical carcinogen or virus, led to the loss of the material in most but not all cases. The protein was also absent-from many but not all spontaneous and induced tumors of the different types tested. Elevated fibrinolytic activity was demonstrated in a number of normal tissues and non-tumor-producing cell lines. It was also present in most sarcomas but absent from most carcinomas examined, except for a cell line from a well-differentiated bladder tumor. The correlation between absence of large external transformation-sensitive protein and fibrinolysis was examined, and it was found that activation of plasminogen was not sufficient to cause the absence of this surface protein.

0534 MATURATION OF MEMBRANE FUNCTION: TRANSPORT OF AMINO ACID BY RAT ERYTHROID CELLS. (Eng.) Wise, W. C. (Medical Univ. South Carolina, 80 Barre St., Charleston, SC 29401). *J Cell Physiol* 87(2): 199-212; 1976.

The membrane changes occurring during cellular maturation of erythroid cells were investigated. The transport of alpha-aminoisobutyric acid, alanine, and N-methylated-alpha-aminoisobutyric acid were studied in erythroblastic leukemic cells, reticulocytes, and RBC of the Long-Evans rat. The dependence of amino acid transport on extracellular sodium concentration was investigated. RBC were found to transport these amino acids only by Na-independent systems. The steady state distribution ratio was less than 1. Reticulocytes were found to transport alpha-aminoisobutyric acid and alanine by Na-dependent systems, but only small amounts of N-methylated-alpha-aminoisobutyric acid. Small amounts of these amino acids were transported by Na-independent systems. The steady state distribution ratio was greater than 1 for Na-dependent transport. The erythroblastic leukemia cell, a model immature erythroid cell, showed marked Na-dependence (greater than 90%) for alpha-aminoisobutyric acid and alanine transport, and over 80% for the Na-dependent transport of N-methyl-alpha-aminoisobutyric acid. The steady state distribution ratio for the Na-dependent transport was greater than 4. In the erythroblastic leukemic cell, at least three Na-dependent systems were found to be present: one includes alanine and alpha-aminoisobutyric acid, but excludes N-methyl-alpha-aminoisobutyric acid; one is for alpha-aminoisobutyric acid, alanine and also N-methyl-alpha-aminoisobutyric acid, and one is for N-methyl-alpha-aminoisobutyric alone. In the reticulocyte, the number of Na-dependent systems was found to be reduced to two: one for alpha-aminoisobutyric acid and alanine and one for N-methyl-alpha-aminoisobutyric acid. In the RBC, no Na-dependent transport was found. Therefore, maturation of the blast cell to the mature RBC is characterized by a systematic loss in the specificity and number of transport systems for amino acids.

0535 CELL SURFACE RECEPTORS AND THEIR DYNAMICS ON TOXIN-TREATED MALIGNANT CELLS.

(Eng.) Nicolson, G. L. (Salk Inst. for Biological Studies, San Diego, CA 92112); Robbins, J. C.; Hyman, R. *J Supramol Struct* 4(1): 15(15)-26(26); 1976.

The binding, mobility, and mode of cell entry of the plant toxin ricin (or RCAII) were investigated on susceptible and partially resistant murine cell lines. When susceptible cells (simian virus 40-transformed 3T3 fibroblast cells and BW5147 lymphoma cells) were examined, ricin bound rapidly, induced endocytosis, and entered the cell cytoplasm via broken endocytotic vesicles to inhibit cell protein synthesis. Addition of lactose within 15 min after initial ricin binding prevented toxicity. After this time lactose addition no longer blocked the inhibition of protein synthesis. In a partially resistant lymphoma (BW5147/RCA3) that shows only a slight reduction in the total number of ricin-binding sites, ricin bound rapidly to the cell surface, but was endocytosed significantly less at low ricin doses compared to its parental line, indicating a possible difference in cell surface behavior. The exposed surface proteins on the BW5147 parental and BW5147/RCA3 resistant lines were examined by ^{125}I-labeling utilizing lactoperoxidase-catalyzed iodination. The radiolabeled components were solubilized and separated by slab gel electrophoresis in sodium dodecyl sulfate. Autoradiograms of the slab gels indicated that two surface components of approximately 80,000 and 35,000 molecular weight were much less exposed or were missing on the resistant line.

0536 ALTERATION OF THE CELL MEMBRANE ARCHITECTURE DURING SUSPENSION AND MONOLAYER CULTURING.

(Eng.) Springer, E. L. (Sch. Public Health, Univ. California, Berkeley, CA 94720); Hackett, A. J.; Nelson-Rees, W. A. *Int J Cancer* 17(3): 407-415; 1976.

Using suspension-growth-adapted HeLa (S_3) cells, the alterations in cell morphology during attachment and spreading on a glass surface in vitro were followed by scanning electron microscopy. Suspension cultivation obviated the need for trypsinization or EDTA treatment of the cells before seeding, thus the cell surface was not chemically altered. The suspension-grown cells were spherical and covered with microvilli. Three hours after seeding into stationary culture, attached cells had surface blebs and large processes, but no microvilli. During the following nine hours, the surface topography altered stepwise, producing a complex lamelloplasm. It was suggested that these membrane events are related to the cell cycle and metastasis.

0537 REGULATION OF CYCLIC NUCLEOTIDE-RELATED ENZYMES IN AN ASTROCYTOMA CELL LINE.

(Eng.) Breckenridge, B. M. (No Affiliation Given). In: *Cyclic Nucleotides in Disease*. Edited by B. Weisse. (Baltimore: University Park Press): 67-77; 1975.

The C-6 cell line, cloned from a chemically induced astrocytoma in the rat, was examined from the standpoints of cyclic AMP metabolism, of cell differentiation, and of glial function. Growth in $N^6,O^{2'}$-dibutyryl adenosine 3',5'-monophosphate (dibutyryl-cyclic AMP) caused morphologic differentiation and increased cyclic AMP phosphodiesterase activity. Growth in 5-bromodeoxyuridine, which blocked the expression of differentiated functions in many cell lines, caused morphologic changes similar to those caused by dibutyryl-cyclic AMP and also increased phosphodiesterase activity. Growth in glucocorticoids resulted in increased cell concentration of cyclic AMP under both basal- and norepinephrine-stimulated conditions and caused a two-fold increase in adenylate cyclase activity. Cell morphology appeared less well differentiated. Prolonged or repeated exposure of C-6 cells to norepinephrine resulted in a greatly diminished cyclic AMP content resulting in part from increase phosphodiesterase activity. The increment in phosphodiesterase activity was independent of Ca++ regulation. C-6 cells contained phosphodiesterases effective in hydrolyzing cyclic AMP and cyclic GMP, however. Both activities were stimulated by Ca++ and a low molecular weight phosphoprotein with high affinity for Ca++.

0538 PLASMA MEMBRANE GLYCOSPHINGOLIPIDS (GSLS OF THE HUMAN LYMPHOBLASTOID CELL-LINE BRI 8 AND DIFFERENCES BETWEEN THE GSLS OF BRI 8 CELLS AND THOSE OF PERIPHERAL LYMPHOCYTES.

(Eng.) Levis, G. M. (Alexandra Hosp., Vas. Sophias and K. Lourou St., Athens 611, Greece); Karli, J. N.; Crumpton, N. J. *Biochem Biophys Res Commun* 68(2): 336-342; 1976.

Plasma membrane glycosphingolipid (GSL) of whole human lymphoblastoid BRI 8 cells and of their plasma membranes were analyzed and the GSL compos tion of BRI 8 cells was compared with that of human peripheral lymphocytes to investigate the role of GSL in membrane functions. Plasma membran of the human lymphoblastoid cell-line BRI 8 contained about ten-fold (expressed relative to per mg of protein) more hematoside and about three-fold more dihexosyl ceramide (GL_2), trihexosyl ceramide (GL_3), and globoside (GL_4), but less monohexosyl ceramide (GL_1) than the whole cell homogenate. Human peripheral blood lymphocytes contained small quantities of hematoside but were two- to three-times more rich in neutral GSLs than BRI 8 cells. GL_3 was the major GSL of BRI 8 cells cultured in media supplemented with piglet or human serum. This GLS was not detected in human peripheral lymphocytes which contained mostly GL_2. The results suggest that growth of human lymphocytes causes activation of enzymes which mediate the elongation of the GL_2 oligosaccharide chain.

0539 MODIFICATIONS OF MAMMALIAN CELL SURFACES INDUCED BY SUGARS: SCANNING ELECTRON MICROSCOPY. (Eng.) Amos, H. (Harvard Medical Sch., 25 Shattuck St., Boston, MA 02115); Leventhal, M.; Chu, L.; Karnovsky, M. J. *Cell* 7(1): 97-103; 1976.

Substitution of galactose, xylose, or mannose for glucose in the growth medium of L cells, or the addition of equal concentrations of the alternate sugars to glucose-containing media, resulted in marked morphological changes. The changes were revealed by conventional staining for light microscopy and by scanning electron microscopy. L cells grew indefinitely on combinations of equal concentrations of glucose and galactose, xylose, or mannose. There appeared to be no significant differences in growth rate on glucose compared to the combinations of sugars cited. Cells subcultured from glucose to the combinations while undergoing rapid multiplication showed marked morphologic changes by light and scanning electron microscopy within 36 hr. Of particular note were the loss of microvilli, flattening of the cells, assumption of polygonal shape, prominence of nuclei and nucleoli, and changes in the structure and distribution of filopodia. Virtually all cells in the population exhibited these changes.

0540 STIMULATION OF MELANOTIC EXPRESSION IN A MELANOMA CELL LINE BY THEOPHYLLINE. (Eng.) Steinberg, M. L. (Wistar Inst. Anatomy Biology, 36th St. at Spruce, Philadelphia PA 19104); Whittaker, J. R. *J Cell Physiol* 87(3): 265-275; 1976.

Theophylline was found to be a potent stimulator of melanogenesis in the RPMI 3460 hamster melanoma cell line. This stimulation by 1.5 mM theophylline was greater than that caused by either 1.5 mM dibutyryl cyclic AMP (db-cAMP) or papaverine. Theophylline and db-cAMP treatments also produced strikingly different morphologies in the monolayered cells. The theophylline effect on melanogenesis was diminished by db-cAMP, whereas simultaneous treatment of cells with db-cAMP and papaverine produced greater stimulation of melanotic activity than either agent acting alone. Theophylline, therefore, may have phenotypic effects that are at least partially independent of phosphodiesterase inhibition. Theophylline stimulated melanin biosynthesis, as measured by rates of 2-[2-^{14}C]thiouracil incorporation, and also caused an increase in the level of tyrosinase activity. This melanotic stimulation was prevented by the presence of 20 μg/ml cordycepin or 0.5 μg/ml cycloheximide. Theophylline inhibited DNA synthesis and mitosis in the melanoma cell cultures but stimulated protein synthesis. However, inhibition of proliferation and the first appearance of induced melanotic activity did not bear an immediate direct relationship to one another.

0541 PLASMA PROLACTIN RESPONSES TO THYROTROPIN-RELEASING HORMONE IN PATIENTS WITH BREAST CANCER. (Eng.) Ohgo, S. (Kobe Univ. Sch. Medicine, Ikuta-ku, Kobe, Japan); Kato, Y.; Chihara, K.; Imura, H. *Cancer* 37(3): 1412-1416; 1976.

Human plasma prolactin levels were measured by homologous radioimmunoassay in 34 patients (aged 35-75 yr) with primary breast cancer and in 19 normal women of similar age. In normal controls mean (± SEM) basal plasma prolactin levels were 11.9 ± 1.5 ng/ml and iv injection of synthetic thyrotropin-releasing hormone (TRH, 500 μg) caused a significant rise in plasma prolactin; the maximum response in 15 control patients was 52.6 ± 3.3 ng/ml, and the maximum response of the 29 cancer patients was 60.3 ± 3.2 ng/ml. Markedly high plasma prolactin levels and exaggerated plasma prolactin responses to TRH were demonstrated in some patients with breast cancer. However, mean basal plasma prolactin levels and mean plasma prolactin increments following TRH in patients with breast cancer did not differ significantly from those in normal subjects. Plasma prolactin responses to TRH were slightly blunted during the administration of androgen in patients with breast cancer. These results suggest that some of the patients with primary breast cancer have abnormal prolactin secretion.

0542 EFFECTS OF CASTRATION, TESTOSTERONE, ESTRADIOL, AND PROLACTIN ON SPECIFIC PROLACTIN-BINDING ACTIVITY IN VENTRAL PROSTATE OF MALE RATS. (Eng.) Kledzik, G. S. (Dept. Physiology, Michigan State Univ., East Lansing, MI 48824); Marshall, S.; Campbell, G. A.; Gelato, M.; Meites, J. *Endocrinology* 98(2): 373-379; 1976.

It was investigated whether lactoperoxidase-catalyzed ^{125}I-ovine prolactin (PRL) binds specifically to the rat prostate. The effects of testosterone, estrogen, and PRL on this binding, in Sprague-Dawley rats were studied. PRL bound specifically to particulate membrane fractions of rat ventral prostate. Unlabeled PRL readily displaced the labeled PRL, whereas ovine growth hormone, luteinizing hormone, follicle stimulating hormone, or thyroid stimulating hormone showed no such competition. Castration reduced the binding of ^{125}I-PRL to about 1/6 of that in intact rats, and injections of testosterone propionate (TP) increased PRL binding to values as great or greater than those in intact controls. Injections of TP into intact immature and mature rats also increased PRL binding. In vitro binding of labeled PRL was inhibited in prostatic tissue removed from intact immature rats two hours after injecting unlabeled PRL, but not in ventral prostates from rats killed 26 or 74 hr after injecting unlabeled prolactin. PRL injected together with TP in castrated rats produced no greater increase in prolactin binding than TP alone, while estrogen appeared to decrease PRL binding beyond the decrease produced by castration alone.

0543 URINARY PUTRESCINE, SPERMIDINE, AND SPERMINE IN HUMAN BLOOD AND SOLID CANCERS AND IN AN EXPERIMENTAL GASTRIC TUMOR. (Eng.) Fujita, K. (Fukita-Gakuen Univ. Sch. Medicine, Toyoake, Aichi 470-11, Japan); Nagatsu, T.; Maruta, K.; Ito, M.; Senba, H.; Miki, K. *Cancer Res.* 36(4): 1320-1324; 1976.

An improved method of assay of urinary polyamines (putrescine, spermidine, and spermine) by column chromatography was applied to the study of cancer patients and an experimental gastric tumor of rats. The total polyamine levels were significantly elevated in normal pregnancy, blood cancers, and some solid cancers. Putrescine levels were significantly higher in patients with almost all kinds of blood cancers and solid cancers than those levels in normal and nontumor patients, and were of diagnostic aid even in solid cancers. A significant increase in putrescine was also noted in the urine of rats with experimental stomach tumors induced by N-methyl-N-nitro-N'-nitrosoguanidine.

0544 EFFECTS OF SUGARS ON THE PHYSIOLOGY OF CULTURED FIBROBLASTS. (Eng.) Johnson, G. S. (Natl. Cancer Inst., Natl. Inst. Health, Bethesda, MD 20014); Schwartz, J. P. *Exp Cell Res* 97(2): 281-290; 1976.

The effects of sugars on cell growth and on cyclic AMP (cAMP) concentration were investigated. Pronounced, rapid, and reversible changes in cultured normal and transformed mouse fibroblasts were observed following removal of sugars from the culture medium. Growth immediately ceased or greatly diminished; it resumed at a normal rate without any appreciable delay following re-addition of glucose. The cell shape changed within six hours to a more flattened and elongated form similar to that of cells treated with N^6-$O^{2'}$-dibutyryl-adenosine-3',5'-monophosphate (db-cAMP). The NAD+/NADH ratio rose four-fold and the ATP level fell about 25% in two hours; however, the cAMP level remained constant. In transformed mouse SVT2 cells, other sugars will not replace glucose. A variant line of SVT2(SVT2SUG+) which grew on numerous sugars was isolated; its growth rate, morphology and adhesion to the substratum, but not cAMP content, were dependent upon the sugar composition. These results suggest that the sugar composition of the growth medium has pronounced effects on cell physiology and that the effects are not mediated by cAMP.

0545 INVASIVE BEHAVIOR BETWEEN SARCOMA AND FIBROBLAST POPULATIONS IN CELL CULTURE. (Eng.) Abercrombie, M. (Strangeways Res. Lab., Wort's Causeway, Cambridge, CB1 4RN, England); Heaysman, J. E. M. *J Natl Cancer Inst* 56(3): 561-570; 1976.

The mutual invasion in culture of a population of standard fibroblasts (chick embryo) and a population of cells from a transplantable mouse sarcoma (MC1M, BAS/56, or 311), or of neonatal mouse fibroblasts, was estimated quantitatively. The confrontation of the pairs of populations was arranged by placing primary explants near each other. After fixation, the distance the cells had migrated from each explant was sampled in the space between the explants where they met and at the sides of the explants where they migrated freely. Nuclear overlap and orientation were also measured. In the sarcoma as in the fibroblast populations, homologous contact inhibition of movement probably produced an oriented migration from the explants before the populations met. About 12-24 hr later, mutual invasion was considerably greater in the sarcoma versus fibroblast than in the fibroblast versus fibroblast experiments. It is proposed that this difference was due to a difference of heterologous contact inhibition in the two types of experiment.

0546 THE CONTROL OF LIVER REGENERATION BY PARATHYROID HORMONE AND CALCIUM. (Eng.) Rixon, R. H. (Division of Biological Sciences, Natl. Res. Council Canada, Ottawa, Canada K1 A 0R6); Whitfield, J. F. *J Cell Physiol* 87(2): 147-156; 1976.

Proliferative incompetence, which is seen in calcium-deprived hepatocytes, was investigated during liver regeneration in pathogen-free Sprague-Dawley rats. Following partial hepatectomy, there were two bursts of hepatocyte DNA-synthetic and mitotic activity that were produced by two subpopulations having different rates of (nearly synchronous) proliferative development. Only about 50% of the cells in both subpopulations could initiate DNA synthesis and enter mitosis when exposed to hypocalcemic conditions in parathyroprivic rats for 24 hr before partial hepatectomy. The proliferatively incompetent hepatocytes in these hypocalcemic rats could be induced to initiate their DNA synthetic and mitotic activity by an ip injection of the calcium-mobilizing parathyroid hormone (50 USP U/100 g) as late as 12 hr after partial hepatectomy. Single ip injections of calcium (0.25 mg/100 g) could also restore the proliferative compete of these hepatocytes, but only when injected at specific periods following partial hepatectomy. The injection of calcium 12-15 hr after partial hepatectomy induced hepatocytes in the first subpopulation to finish their development and enter mitosis, but did not affect the second, more slowly developing, subpopulation. Calcium had to be injected 25 hr after partial hepatectomy to stimulate proliferation in this second subpopulation. These data suggest that the hepatocytes that became proliferatively incompetent by prolonged exposure to a hypocalcemic environment are proliferatively activated by partial hepatectomy, but their proliferative development stops at a calcium-dependent stage near the end of the prereplicative phase of development.

0547 HUMAN GASTRIC CHORIOCARCINOMA SERIALLY TRANSPLANTED IN NUDE MICE. (Eng.) Kameya, T. (Natl. Cancer Center Res. Inst., Tsukiji 5-chome, Chuo-ku, Tokyo, Japan); Shimosato, Y.; Tumuraya, M.; Ohsawa, N.; Nomura, T. *J Natl Cancer Inst* 56(2): 325-332; 1976.

A gastric choriocarcinoma cell line capable of producing human chorionic gonadotropin (HCG) was studied by sc transplantation and serial passages into nude mice fed under specific pathogen-free (SPF) conditions. The tumor-take rate at the serial heterotransplantation in SPF mice was high (greater than 95%), in contrast with a low rate in conventional animals (35%). The restoration of morphology and function of the original neoplasm were exclusively verified in SPF mice. Multiple lung metastases were found in two animals. The production, storage, and excretion of HCG by tumor cells were confirmed by its high content in serum and cystic fluid in tumors and by its intracellular localization. The tumor cells also contained a specific placental alkaline phosphatase in their membranes. The cells were various trophoblastic types ranging from primitive cytotrophoblasts to typical syncytial cells. The hormone effects of the tumor on sex organs of tumor-bearing animals were evident.

0548 GROWTH HORMONE AND DRUG METABOLISM. ACUTE EFFECTS ON NUCLEAR RIBONUCLEIC ACID POLYMERASE ACTIVITY AND CHROMATIN. (Eng.) Spelsberg, T. C. (Mayo Clinic, Rochester, MN 55901); Wilson, J. T. *Biochem J* 154(2): 439-448; 1976.

Male Sprague-Dawley rats, subjected either to sham operation or to hypophysectomy and adrenalectomy, were maintained for 10 days before treatment with growth hormone. The acute effects of growth hormone on the rat liver nuclear RNA polymerase I (nucleolar) and II (nucleoplasmic) activities, as well as the chromatin template capacity, were studied. It was verified that the assays for polymerase activities require a DNA template, all four nucleoside triphosphates, and a bivalent cation, and that the acid-insoluble radioactive product represents RNA. Under high-salt conditions, DNA-ike RNA (polymerase II) was synthesized, and nder low-salt conditions in the presence of α-manitin, rRNA (polymerase I) was synthesized. In he livers of hypophysectomized/adrenalectomized ats, growth hormone increased the activity of both RNA polymerase enzymes and the chromatin template capacity within one hour. The effects lasted for 12 hr with polymerase II but for only 6 hr with polymerase I. Sham-operated rats respond to growth hormone in a manner similar to that shown by hypophysectomized/adrenalectomized rats. These results demonstrate an enhancement of RNA polymerase I activity in response to growth hormone. The growth-hormone-induced derepression of the chromatin DNA could represent the basis of the growth-hormone-induced enhancement of RNA polymerase II activity in the hypophysectomized/adrenalectomized rats, although some effect of growth-hormone on the polymerase enzymes is suggested. No correlation was observed between the transcriptional responses to growth hormone and activities of the mixed-function oxidases. It is concluded that the growth-hormone-induced growth in the liver of hypophysectomized/adrenalectomized rats is preceded by increases in RNA polymerase II activities and a de-repression of the chromatin DNA. Since these effects are detected within minutes after growth-hormone treatment and before growth-hormone-induced increases in general protein synthesis and some enzyme activities are noted, it is proposed that growth-hormone action not only requires transcriptional response, but that this response may represent a primary site of action in the cell.

0549 STIMULATION OF GROWTH OF A TRANSPLANTABLE HEPATOMA IN RATS BY PARENTERAL NUTRITION. (Eng.) Cameron, I. L. (Univ. Texas Health Science Center 7703 Floyd Curl Drive, San Antonio, TX 78284); Pavlat, W. A. *J Natl Cancer Inst* 56(3): 597-602; 1976.

Young BUF rats of similar ages were inoculated with the transplantable Morris hepatoma 7777. At 4 wk after inoculation, one group was given total iv feeding at high caloric and nutritional levels for 2 wk. Such hyperalimentation stimulated a more rapid tumor growth. In addition, the tumors from rats fed parenterally had higher mitotic activity and larger areas of necrosis, indicating that iv feeding caused the tumor to undergo faster cell turnover with greater cell production and cell loss. Analysis of organ weights showed that parenteral feeding caused atrophy of the intestines, whereas spleen weights of the hepatoma-bearing rats fed iv were greater than those of po-fed hepatoma-bearing rats.

0550 EFFECT OF THE GROWTH CONDITIONS ON THE RATIO BETWEEN NATIVE 40S AND 60S RIBOSOMAL SUBUNITS IN VARIOUS CELL TYPES. (Eng.) Nissen-Meyer, J. (Dept. Biochemistry, Univ. Bergen, 5000 Bergen, Norway); Eikhom, T. S. *Exp Cell Res* 98(1): 41-46; 1976.

A non-stoichiometric ratio of the native ribosomal subunits was observed in rapidly growing transformed cells in suspension culture. Both the plasmacytoma cell line MPC-11 and mouse L cells (line 929) demonstrated a great excess of the small ribosomal subunits in the cytoplasm. These cells contained a large quantity of native 40S subunits and a small quantity of native 60S subunits, and the difference was more pronounced for cells having a generation time of 16 hr than for cells having a generation time of 24 hr. Ribosomes isolated from starved cells did not contain this great excess of the small subunits. This was true for both L cells and Krebs II ascites cells isolated shortly before the tumor killed the host. Under these growth conditions the pool of native 60S subunits was greatly increased compared to the same pool in rapidly growing cells in suspension culture. Liver cells isolated from mice infected with Krebs II ascites cells or MPC-11 cells apparently contained a lower ratio between native 40S and 60S ribosomal subunits (as judged from sucrose gradients) than did liver cells isolated from uninfected animals. These experiments indicate that the ability to display a non-stoichiometric ratio between the ribosomal subunits may not be restricted to transformed cells.

0551 ENDOTHELIAL GROWTH FACTOR PRESENT IN TISSUE CULTURE OF CNS TUMORS. (Eng.)

Kelly, P. J. (Univ. Texas Medical Branch, Galveston, TX 77550); Suddith, R. L.; Hutchinson, H. T.; Werrbach, K.; Haber, B. *J Neurosurg* 44(3): 342-346; 1976.

Human endothelial cells obtained from postpartum umbilical veins and placed in primary tissue cultures were treated with media from cultures of human and experimental (C_6 rat astrocytoma, three lines, and a human fibroblast) central nervous system tumors. Endothelial proliferation was determined by the uptake of ^{3}H thymidine with autoradiography and represented as the thymidine labeling index (TI), which is the proportion of ^{3}H thymidine-labeled endothelial cells to total number of cells counted. There was a marked increase in the TI when tumor-conditioned medium was added to endothelial cultures (range 28.7% to 98.3%) when compared to controls (2.1%) and endothelium with conditioned media from fibroblasts (4.5%). This study demonstrates the presence of a chemical substance produced by tumor cells which results in endothelial proliferation. The system described provides a useful assay technique for the further characterization of this endothelial growth factor.

0552 HUMAN VASCULAR ENDOTHELIAL CELLS IN CULTURE: LACK OF RESPONSE TO SERUM GROWTH

FACTORS. (Eng.) Haudenschild, C. C. (Harvard Medical Sch., Boston, MA 02115); Zahniser, D.; Folkman, J.; Klagsbrun, M. *Exp Cell Res* 98(1): 175-183; 1976.

DNA synthesis was studied in primary cultures of human umbilical cord vein endothelial cells using autoradiography. Sparse populations of endothelial cells synthesized DNA in vitro and divided until confluence was reached. Confluent endothelial cells stopped dividing and could not be stimulated to synthesize DNA by the addition of fresh serum. The inability of confluent endothelial cells to synthesize DNA was found using sera prepared from fetal calf, adult human, and human umbilical cord blood and with media containing serum concentrations ranging from 0 to 100%. These confluent endothelial cells were viable since they migrated into wounds made in a monolayer and subsequently synthesized DNA. The confluent cells also excluded trypan blue. In contrast, cultures of other cells such as human foreskin and BALB/c-3T3 mouse fibroblasts were readily stimulated to synthesize DNA at confluence by the addition of calf or human serum. The extent of the stimulation was dependent on the serum concentration. It was concluded that human umbilical cord vein endothelial cells exhibit a stringent pattern of growth control in vitro since confluent cultures do not respond to serum growth factors. It was suggested that this unique property of endothelium may be necessary for the maintenance and function of blood vessels in vivo.

0553 HISTOCHEMICAL CHARACTERISTICS OF MUCOSUBSTANCES IN THREE SOFT-TISSUE TUMOURS.

(Eng.) Filipe, M. I. (Westminster Medical Sch., London, England); Mackenzie, D. H. *J Pathol* 118(1) 17-19; 1976.

The histochemical characteristics of mucosubstance produced by 16 myxoid liposarcomas, five malignant fibrous histiocytomas, and six intramuscular myxomas were studied in an attempt to use these characteristics as a diagnostic aid. The material was fixed in 10% formol saline. Myxoid liposarcoma contained neutral mucosubstances that were absent in the other two soft-tissue tumors. Testicular hyaluronidase digestion abolished staining reactions with alcian blue at pH 2.5 and 1.0, with azure A at pH 4, and with high iron-diamine. However, the enzyme removed both hyaluronic acid and some sulfated mucosubstances such as chondroitin sulfate A and C from the tissues and did not distinguish between these substances. It is unlikely that histochemical studies will contribute significantly to the differentiation of these three tumors.

0554 ADAPTATIONS OF THE CULTURE METHOD OF WOLFF FOR NEOPLASTIC NERVOUS SYSTEM.

(Eng.) Lyser, K. M. (Hunter Coll., City Univ., Ne York, NY 10021). *Tissue Culture Assoc Manual* 1(3) 133-138; 1975.

A revised culture method for a central or peripheral nervous system tumor, adapted from Wolff's technique for neoplastic necrosis system, is described. This method is designed to promote maintenance of three dimensional organization and cellular interrelations in vitro. The vitelline membrane (one for each culture dish) is separate from unincubated chicken eggs, and the mesonephr (one for every two cultures) is separated from 8 day-old embryos. For primary explant cultures, t medium, (consisting of 1 ml penicillin-streptomycin, 10 ml horse serum, 10 ml embryo extract, and 25 ml agar), vitelline membrane, and mesonephros are prepared first, and then the tumor tissue is added to the culture dish. To establish cultures using cell lines or other monolayer cultures, the cells are harvested, centrifuged 10 min at 1,000 rpm, and the pellet is transferred to the culture dish. For both established cell lines and the tumor explant culture systems, the tissue is placed on top of a disc of mesonephros in a fold of vitelline membrane, excess liquid is blotted off, and the mesonephros membrane folded over the explant to make a sandwich. The culture dishes were sealed with melted paraffin and incubated at 37 C. In primary explant cultures, the tumor tissue usually maintained the same level of differentiation as that observed in the original biopsy. The extent of mesonephros invasion by tumor tissue corresponded with the invasiveness of the tumor in vivo. Primary explants were viable for a number of weeks. Neural tumors that do not invade adjacent mesonephros may be sequentially transferred in mosaic cultures. The author suggests that this technique may be useful for combining organotypic and monolayer culture techniques.

0555 CORRELATION OF IN VIVO MALIGNANCY WITH IN VITRO PROPERTIES OF HUMAN-MOUSE HYBRID CELLS. (Eng.) Bordelon, M. R. (Baylor Coll. Medicine, Houston, TX 77025); Shows, T. B.; Chen, T. R.; Stubblefield, E. *J Natl Cancer Inst* 56(3): 499-508; 1976.

The in vivo tumorigenicity of malignant mouse-nonmalignant human somatic cell hybrids was correlated with the in vivo characteristics. The renal adenocarcinoma mouse cell line RAG and the normal, diploid human cell line WI-38 were used as the fusion parents. Five independent RAG-WI-38 hybrid clones were tested for concanavalin A (Con A) agglutination patterns, in vitro invasiveness, and tumor formation in immunosuppressed BALB/c Crgl mice. Tests on the parental lines showed that RAG cells agglutinated at much lower levels of Con A than did the WI-38 cells. RAG cells overgrew WI-38 cells in the in vitro invasiveness assay. RAG cells readily formed tumors in untreated adult or young immunosuppressed mice, whereas the WI-38 cells did not. The five hybrid clones were all similar, since they had Con A agglutination levels ntermediate to those of both parents, though atterns were more ''tumor-like'', overgrew the WI-8 cells in the invasiveness assay, and formed umors in immunosuppressed mice.

556 MASS PRODUCTION OF ANIMAL CELLS IN NUDE MICE WITH RETENTION OF CELL SPECIFIC ARKERS. (Eng.) Freedman, V. H. (Albert Einstein oll. Medicine, Bronx, NY 10461); Brown, A. L.; linger, H. P.; Shin, Seung-Il. *Exp Cell Res* 98(1): 43-151; 1976.

iochemical analysis of macromolecular constituents f somatic cells in culture frequently requires the production of large quantities of cells from small initial populations, often a laborious and expensive procedure. It was shown that nude mice, because of their genetic immune deficiency, provide a relatively simple and reliable means of growing large quantities of cells irrespective of the species or tissue of origin. Most established animal cell lines can grow as large tumors in these athymic mice. The passage of mammalian cells (HS0643, HeLa, A9, RAG, Cl-1-D, MPC 45-6, SV101, SVRE-9, RKT-TG1, WOR-6, BHK-T6a, SHI) in nude mice does not cause either the loss or modification of specific biochemical, chromosomal, antigenic or other cellular markers, nor the induction of malignant transformation of the host cells. Tumors formed by the injected cells grow as localized, encapsulated masses, and host cell admixture due to elements of the vascular system in the tumor is variable but not extensive. Pure cultures of the original cell type can easily be recovered from the tumors if they are derived from previously established cell lines. The use of nude mice for large scale growth of animal cells is particularly advantageous for cell lines which are not adapted to mass suspension culture and for highly differentiated functional tumor cells which cannot be grown in vitro.

0557 ISOLATION OF VARIANT LYMPHOMA CELLS WITH REDUCED GROWTH REQUIREMENTS FOR EXTRACELLULAR CALCIUM AND MAGNESIUM AND ENHANCED ONCOGENICITY. (Eng.) Brennan, J. K. (Univ. Rochester Sch. Medicine, Rochester, NY 14642); Lichtman, M. A.; Chamberlain, J. K.; Leblond, P. *Blood* 47(3): 447-459; 1976.

Variant L5178Y mouse lymphoma cells with reduced growth requirements for extracellular calcium and magnesium were isolated and propagated, and their growth characteristics, morphology, and oncogenicity were compared to those of their progenitor cells. The population was isolated by exposing an established cell line of malignant mouse lymphocytic cells to a culture deficient in calcium and magnesium. The growth, viability, and calcium and magnesium contents of wild- and variant-type cells in normal medium were similar after 1 mo or 60 passages. Variants had a 20% longer doubling time and a 50% greater median volume (a constant feature of this cell in any medium). However, in deficient medium, variants grew at 90% of the normal rates, reaching a plateau of 75% of the normal cell concentration. Wild-type cells did not grow. Light microscopy revealed that the variant cells were larger. Scanning electron microscopy demonstrated that cells with differentiated surface properties could be distinguished in both populations: 56% of the variant cells had finger-like microvilli and 25% had broad surface projections, as compared to 24 and 57%, respectively, of the wild-type population. Wild-type cells were less aggregable than variant forms; variants had 10 to 100-fold more aggregates/ml culture. The number of colonies produced in viscous normal medium was similar for both cell types; however, nearly all wild-type colonies, predominantly rounded in culture, had tightly grouped cells, whereas approximately 10% of the variant colonies had loosely clustered cells, pleomorphic with elongate, stellate, and rounded forms. Under deficient conditions, variant cells retained normal cloning efficiency and were tightly clustered. Variant cells produced an accelerated rate of tumor development and a higher overall mortality than wild-type cells when injected into male BDF1 mice. A suggested analogy between the selective influence of calcium and magnesium deprivation in vitro and the evolution of thymic dysplasia in divalent cation-deprived rodents is presented.

0558 FOLIC ACID BINDING PROTEIN IN ACUTE MYELOID LEUKAEMIA. (Eng.) Gorst, D. W. (Univ. Manchester and the Royal Infirmary, Manchester, England); Courtis, M.; Delamore, I. W. *J Clin Pathol* 29(1): 60-62; 1976.

Folic acid binding protein (FABP) was estimated in 94 normal control subjects, 18 patients with untreated acute myeloid leukemia (AML), 18 folate-deficient patients, six patients in the terminal blastic phase of chronic myeloid leukemia (CML), and two patients with untreated CML. FABP was estimated using tritiated pteroylmonoglutamates to saturate the binders. Folate-deficient patients had a mean level of 139 pg/ml FABP, in comparison with 76 pg/ml in normal subjects. The mean value for the AML patients was 338 pg/ml, and for CML patients was 179 pg/ml. AML patients with exceptionally large monocytic components showed especially high levels of FABP. The two patients with untreated CML had normal levels. The finding high levels of a folate binding protein (normally present in very small amounts) in the serum of patients with untreated AML is unexpected.

0559 THE CONTENT AND METABOLISM OF CYCLIC ADENOSINE 3',5'-MONOPHOSPHATE AND CYCLIC GUANOSINE 3',5'-MONOPHOSPHATE IN ADENOCARCINOMA OF THE HUMAN COLON. (Eng.) DeRubertis, F. R. (Veterans Administration Hosp., Pittsburgh, PA 15240); Chayoth, R.; Field, J. B. *J Clin Invest* 57(3): 641-648; 1976.

Cyclic adenosine 3',5'-monophosphate (cAMP) and cyclic guanosine 3,5'-monophosphate (cGMP) levels and metabolism in carcinomas of the human colon were compared to those of the adjacent uninvolved mucosa after therapeutic resection of these tissues. The cAMP content of the tumors, determined in samples frozen 30 min after excision, was significantly lower than that of the adjacent mucosa, when expressed on the basis of tissue wet weight, protein, or DNA content. By contrast, the cGMP content of the tumors was higher than that of the surrounding mucosa if calculated on the basis of tissue wet weight, but this difference did not persist when correction was made for the higher protein or DNA content of the tumors. Incubation of mucosa or tumor with or without theophylline in vitro increased tissue cAMP and cGMP content above levels observed in frozen samples of the same tissue. However, after such incubations cAMP levels in the tumors remained clearly below that of the mucosa, while cGMP content of the two tissues did not differ. The failure of theophylline to abolish differences in cAMP content and the comparable activities of high and low Km cAMP-phosphodiesterase in homogenates of the two tissues suggested that the lower cAMP content of the tumors was a consequence of diminished cAMP synthesis rather than enhanced degradation. This was supported by the reduction in basal and maximal prostaglandin E_1 (PGE_1)-responsive adenylate cyclase activity found in tumor homogenates relative to those of mucosa, and the lower levels of cAMP in tumor slices after incubation of the tissues with a maximal dose of PGE_1 and theophylline. Since sodium fluoride (NaF)-responsive adenylate cyclase activity was not significantly reduced in the tumors, the lower basal and PGE_1 activities may not be related to a deficiency of the catalytic unit of the cyclase complex in this tissue. The reduced activity of the adenylate cyclase-cAMP system and/or reduced tissue cAMP-to-cGMP ratios in the pathogenesis of colonic carcinoma might favor unregulated cellular proliferation.

0560 PRODUCTION OF HUMAN CHORIONIC GONADOTROPIN IN HELA CELL CULTURES. (Eng.) Ghosh, N. K. (New York Univ. Medical Center, New York, NY 10016); Cox, R. P. *Nature* 259(5542): 416-417; 1976.

A specific radioimmunoassay revealed that HeLa$_{65}$ cells produce the β subunit of human chrionic gonadotropin (HCG). The amount HCG-β produced depends on the concentration of sodium butyrate in the medium. Heteroploid HeLa cells, after many years in culture, produce several proteins normally found only during embryonic development, or synthesized by specialized cells; the production of HCG-β provides additional evidence for the putative derepression of an element of the genome with the synthesis of a protein normally produced only by the specialized trophoblastic cells.

0561 NUCLEAR GLYCOGEN SYNTHESIS IN EHRLICH ASCITES CELLS. (Eng.) Zimmerman, H.-P. (Institut fuer Zellforschung am Deutschen Krebsforschungszentrum, Heidelberg, W. Germany); Granzow, V.; Granzow, C. *J Ultrastruct Res* 54(1): 115-123; 1976.

Ultrastructural evidence for nuclear glycogenesis in Ehrlich ascites cells is presented. Electron microscopic radioautography has revealed in vitro glycogen synthesis by two strains of Ehrlich ascites cells. After labeling the cells with D-glucose-^{3}H, radioautographic reaction corresponding to accumulations of glycogen beta-particles was found predominantly within the nuclei, but also in the cytoplasm. In addition, labeling was observed unrelated to visible glycogen particles in the wider area surrounding the nuclear glycogen accumulations. Treatment of thin sections with the enzyme, amyloglucosidase, led to the disappearance of glycogen particles. Simultaneously, a loss of labeling related and unrelated to visible glycogen occurred. The nuclear glycogen deposits were not associated with nuclear membranes. The authors conclude that certain strains of Ehrlich ascites cells are equipped with an intranuclear mechanism for glycogen synthesis.

0562 CONCANAVALIN A-INDUCED AGGLUTINATION OF HUMAN LEUKEMIC AND LYMPHOMA CELLS. (Eng.) Maca, R. D. (Univ. Iowa Coll. Medicine, Iowa City, IA 52242). *Cancer Res* 36(4): 1218-1221; 1976.

A new spectrophotometric method demonstrated that concanavalin A agglutinated normal lymphocytes, lymphoma cells, and leukemic cells from chronic lymphocytic leukemia and from acute myelocytic and lymphocytic leukemia. However, there was a marked difference in the kinetics of this agglutination process. Leukemic blast cells and cells from a patient with convoluted lymphoma agglutinated poorly. Conversely, the degree of agglutination for chronic lymphocytic leukemia cells was greater than that for the blast cells and also slightly greater than that for normal lymphocytes. Cultured cells from a Burkitt's lymphoma (Raji), and from a patient with poorly differentiated lymphoma, agglutinated very rapidly with concanavalin A. Prior incubation of all cell types with neuraminidase markedly enhanced the agglutination process to a degree similar to that of trypsinization. The results illustrate the usefulness of this method in quantitating the kinetics of agglutination of various human neoplastic cell types by concanavalin A.

0563 A COMPARISON OF THE ABILITY OF NORMAL LIVER, A PREMALIGNANT LIVER, A SOLID HEPATOMA AND THE ZAJDELA ASCITIC HEPATOMA, TO TAKE UP AMINO ACIDS IN VITRO. (Eng.) Bhargava, P. M. (Regional Res. Lab., Hyderabad 500009, India); Szafarz, D.; Bornecque, C. A.; Zajdela, F. *J Membr Biol* 26(1): 31-41; 1976.

The net total uptake of several amino acids (leucine, phenylalanine, valine, and methionine) at low (0.8-3.1 μmoles/liter) as well as high (800-1200 μmoles/liter) extracellular concentrations by normal rat liver, a premalignant liver, a solid hepatoma, and the Zajdela ascitic hepatoma cells, was compared under conditions in which protein synthesis continued. At low amino acid concentrations, the initial (3 min) total uptake of the various amino acids in the Zajdela cells was 3-10 (an average of seven) times more, and the intracellular concentration of the labeled amino acids taken up 14-45 (average 31) times more, than in normal liver. At the high amino acid concentrations, the total uptake in the Zajdela cells at 60-120 min was 2-5 (average 3.5) times more, and the intracellular concentration of the amino acids taken up 8-18 (average 13) times more, than in normal liver; the corresponding values for the premalignant liver and the solid hepatoma were between those for normal liver and the Zajdela cells. The rate of the total uptake of amino acids, their intracellular concentration, the proportion of the amino acid taken up utilized for protein synthesis, the rate of incorporation of the amino acid taken up into protein, and the cellular growth rate, seemed to be correlated in the four cell/tissue preparations studied. In most cases, the rate of the net uptake fell drastically with time; the uptake virtually stopped after 90-180 min, probably due to lack of serum in the incubation medium.

0564 FLUORESCENCE EMITTED BY 1-ANILINO-8-NAPHTHALENE SULPHONATE BINDING TO NORMAL AND CANCEROUS MOUSE CELLS. (Eng.) Vaillier, J. (Unite de Cancerologie Experimentale et de Radiobiologie U 95, INSERM, Plateau de Brabois, 54500 Vandoeuvre-les-Nancy, France); Vaillier, D.; Trentesaux, C.; Robert, J. *Cytobios* 13(49): 23-30; 1975.

The kinetics of binding to hydrophobic sites of the hydrophobic fluorescent probe 1-anilino-8-naphthalene sulphonate (ANS) was dependent on the cell type. In the case of normal nucleated spleen cells (from C3H/Hc, Swiss/B and AKR mice), ANS emitted a fluorescence the intensity of which varies according to the time of exposure; this was biphasic, ending with a plateau. In the case of cancer cells (rhabdomyosarcoma, RV2 tumor in C3H/He, TP4 tumor in Swiss/B, and leukemic AKR), the intensity of the fluorescence was higher than in the case of normal spleen cells, reaching a maximum value before turning back to a plateau of lower intensity. This method could help in characterizing a cell type, or a cell status, by studying the kinetics of the fluorescence emitted by ANS exposed hydrophobic sites of cultivated living cells.

0565 STUDIES ON THE STIMULATION AND SUPPRESSION OF DEOXYRIBONUCLEIC ACID (DNA) SYNTHESIS IN LYMPH NODE CELLS OF MICE BEARING PROGRESSIVELY GROWING TUMOURS. (Eng.) Chandradasa, K. D. (Sub-Dept. Immunology, Univ. Liverpool, Liverpool L69 3BX, England); Bradley, J. *Br J Cancer* 33(1): 27-35; 1976.

0566 RNA-CONTROLLED DNA SYNTHESIS *IN VITRO*: DETECTION OF POLYDESOXYADENYLATE IN DNA COMPLEMENT OF ANTIMESSENGER DNA. (Rus.) Frolova, L. Iu. (Inst. Molecular Biology, Acad. Sci. USSR, Moscow, USSR); Meldrais, Ia.; Kiselev, L. L. *Dokl Akad Nauk SSSR* 225(6): 1442-1445; 1975.

0567 NEUROCHEMICAL STUDIES IN A MOUSE TERATOMA WITH NEUROEPITHELIAL DIFFERENTIATION. PRESENCE OF CYCLIC AMP, SEROTONIN AND ENZYMES OF THE SEROTONERGIC, ADRENERGIC AND CHOLINERGIC SYSTEMS. (Eng.) Orenberg, E. K. (Stanford Univ. Sch. Medicine, Stanford, CA 94305); Vandenberg, S. R.; Barchas, J. D.; Herman, M. M. *Brain Res* 101(2): 273-281; 1976.

0568 BIOLOGICAL PROPERTIES OF AN IMPROVED TRANSFORMATION ASSAY FOR NATIVE AND DENATURED T4 DNA. (Eng.) Baltz, R. H. (Biochemical Development Division, Eli Lilly and Co., Indianapolis, IN 46203). *Virology* 70(1):52-64; 1976.

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0572 ABSENCE OF MESSENGER RNA AND GENE DNA FOR β-GLOBIN CHAINS IN HEREDITARY PERSISTENCE OF FETAL HEMOGLOBIN. (Eng.) Forget, B. G. (Harvard Medical Sch., Boston, MA 02115); Hillman, D. G.; Lazarus, H.; Barell, E. F.; Benz, E. J., Jr.; Caskey, C. T.; Huisman, T. H. J.; Schroeder, W. A.; Housman, D. *Cell* 7(3): 323-329; 1976.

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0575 REGULATION OF HEPATOMA ADENYLATE CYCLASES BY PROSTAGLANDINS (Proceedings Abstract). (Eng.) Pradhan, T. K. (Univ. Florida Medical Sch., Gainesville, FL 32610); Criss, W. E. *IRCS Med Sci (Suppl)* 3(10): 5; 1976.

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0579 HELA CELL DEOXYRIBONUCLEIC ACID DEPENDENT RNA POLYMERASES: FUNCTION AND PROPERTIES OF THE CLASS III ENZYMES. (Eng.) Weil, A. P. (Univ. Texas Medical School at Houston, Houston, TX 77030); Blatti, S. P. *Biochemistry* 15(7): 15000-1509; 1976.

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PREFACE

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NOTE

Journal names are abbreviated according to the list of abbreviations used by *Index Medicus*. For journals not covered by *Index Medicus*, the abbreviations found in *Chemical Abstracts Service Source Index*, 1907-1974 Cumulative, are used. New journals are verified in *New Serial Titles* and abbreviated according to *International Standard ISO 833*. An asterisk indicates the author to address (other than the primary) in requesting reprints.

LANGUAGE ABBREVIATIONS

Afr.	Afrikaans	Ind.	Indonesian
Ara.	Arabic	Ita.	Italian
Bul.	Bulgarian	Jpn.	Japanese
Chi.	Chinese	Kor.	Korean
Cro.	Croation	Lav.	Latvian
Cze.	Czech	Lit.	Lithuanian
Dan.	Danish	Nor.	Norwegian
Dut.	Dutch	Pol.	Polish
Eng.	English	Por.	Portuguese
Est.	Estonian	Rum.	Rumanian
Fin.	Finnish	Rus.	Russian
Fle.	Flemish	Ser.	Serbo-Croatian
Fre.	French	Slo.	Slovak
Geo.	Georgian	Spa.	Spanish
Ger.	German	Swe.	Swedish
Gre.	Greek	Tha.	Thai
Heb.	Hebrew	Tur.	Turkish
Hun.	Hungarian	Ukr.	Ukrainian
Ice.	Icelandic	Vie.	Vietnamese

ABBREVIATIONS USED IN ABSTRACTS

A	angstrom(s)	M	molar
ACTH	adrenocorticotropic hormone	mM	millimolar
ADP	adenosine diphosphate	μM	micromolar
AMP	adenosine monophosphate	mOsm	milliosmolar
ATP	adenosine triphosphate	mEq	milliequivalents
BCG	Bacillus Calmette Guerin	min	minute(s)
bid	twice daily	mo	month(s)
C	degrees centigrade	MTD	maximum tolerated dose
cal	calorie(s)	N	normal concentration
kcal	kilocalorie(s)	NAD	nicotinamide adenine dinucleotide
cc	cubic centimeter(s)	NADH	reduced nicotinamide adenine dinucleotide
Ci	curie(s)	NADP	nicotinamide adenine dinucleotidephosphate
mCi	millicurie(s)	NADPH	reduced nicotinamide adenine dinucleotide-phosphate
μCi	microcurie(s)		
cm	centimeter(s)	ng	nanogram(s) (10^{-9})
CNS	central nervous system	od	once daily
cpm	counts per minute	Pa	ambient pressure
dl	deciliter(s)	PAS	periodic acid-Schiff
ml	milliliter(s)	pg	picogram(s) (10^{-12})
μl	microliter(s)	pgEq	picogram equivalent
DNA	deoxyribonucleic acid	po	orally
ED$_{50}$	median effective dose	ppb	parts per billion
EDTA	ethylenediamine tetraacetic acid	ppm	parts per million
ESR	erythrocyte sedimentation rate	qid	four times daily
g	gram(s)	qod	every other day
kg	kilogram(s)	QO$_2$	oxygen quotient
mg	milligram(s)	R	roentgen(s)
μg	microgram(s)	RBC	red blood cells (erythrocytes)
Hb	hemoglobin	RNA	ribonucleic acid
hr	hour(s)	sc	subcutaneous
ia	intra-arterial	sec	second(s)
ic	intracerebral	SGOT	serum glutamic-oxalacetic transaminase
icav	intracavitary	SGPT	serum glutamic-pyruvic transaminase
id	intradermal	SRBS	sheep red blood cells
ILS	increased life span	TCD	tissue culture dose
im	intramuscular	TCD$_{50}$	median tissue culture dose
ip	intraperitoneal	tid	three times daily
ipl	intrapleural	U	unit(s)
it	intratumorous	mU	milliunit(s)
IU	International Unit	UV	ultraviolet
iv	intravenous	vol	volume
K$_m$	Michaelis constant	WBC	white blood cells (leukocytes)
LD	lethal dose	wk	week(s)
LD$_{50}$	median lethal dose	wt	weight
m	meter(s)	x	times
mm	millimeter(s)	yr	year(s)

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0601 ESTROGEN DRUGS: DO THEY INCREASE THE RISK OF CANCER? (Eng.) Marx, J. L. (no affiliation given). *Science* 191(4229): 838-840, 882; 1976.

Retrospective studies in which the estrogen use of patients with endometrial cancer was compared with that of matched controls were reviewed. The results of all of the studies showed that significantly more of the cancer patients than of the controls had been estrogen users. For the relief of menopausal symptoms conjugated estrogens are usually given, but diethylstilbestrol may be used; there is evidence linking both hormone drugs to cancer. Two observations to be explained, however, are that the incidence of endometrial cancer did not increase between earlier studies and later ones, and that the incidences of breast and endometrial cancer increase after menopause. It was suggested that not enough time had elapsed between the introduction of and widespread use of estrogen drugs and the present for carcinogenicity to be determined, and it was pointed out that the incidence of endometrial cancer is greatest among those women most likely to be given menopausal estrogen therapy (Caucasian women, 50 or more yr of age, in the upper socioeconomic groups). Studies of oral contraceptives have produced contradictory results; some studies implicated the sequential pill in endometrial cancer and others suggested a link between pill use and breast cancer in women who had a history of benign breast disease (a high risk group). However, other studies show a decreased incidence of benign breast disease in pill users, so the pill may be protective for some. Because "the pill" is really many different formulas and because the widespread use of these drugs is so recent, it was concluded that more time will be needed to determine the carcinogenicity of the contraceptive pill. (1 reference)

0602 ESTROGEN THERAPY IN POSTMENOPAUSAL WOMEN (Editorial). (Eng.) Collins, J. A. (Dept. Obstetrics and Gynecology, Univ. Western Ontario, London, Ontario, Canada). *Can Med Assoc J* 114(5): 401-402; 1976.

Estrogen therapy has been used to treat postmenopausal osteoporosis and atherosclerotic disease. However, the value of this therapy is questionable, and recent reports have indicated that 21% of a series of theca-granulosa-cell tumors were associated with endometrial carcinoma, which was attributed to stimulation of the endometrium by estrogen secreted by the tumor. This study supports the theory that estrogen is not an oncogenic agent, but instead a promoter of growth in endometrial cells, including those that have undergone viral and genetic changes and may become cancer cells. Estrogen therapy should be limited to patients with biologic symptoms, and the administration schedule must allow for withdrawal bleeding. Patients must be checked for hyperlipidemia and symptoms due to gallstones. (10 references)

0603 COLOR ADDITIVES: IS SUCCESSOR TO RED DYE NO. 2 ANY SAFER? (Eng.) Boffey, P. M. (no affiliation given). *Science* 191(4229): 832-834; 1976.

The thoroughness of the safety tests to which Red No. 40 (the most likely successor to Red No. 2) was subjected was discussed and compared to those which resulted in the ban of Red No. 2. In Canada, Red No. 2 was approved for continued use, while Red No. 40 was banned. A 21-mo study, in which Red No. 40 produced only moderate growth suppression, was rejected by Canadian authorities because the number of test animals surviving to the end of the study period was too small (90 out of 300 rats) and because 21 mo was not deemed long enough for a carcinogenicity test. A Russian study which concluded that Red No. 2 is carcinogenic lasted 33 mo, while another study, which did not detect carcinogenicity for this dye, lasted only 24 mo. The FDA recommends life-time feeding studies; Red dye No. 40 was approved on the basis of only one such study in one species (rat). The widespread use of Red No. 40 will probably result if Red No. 2 is no longer useable, unless future studies reveal flaws in its safety record. (No references)

0604 ETIOLOGY OF GASTROINTESTINAL CANCER: HEREDITY VS ENVIRONMENT (Editorial). (Eng.) Sherlock, P. (Memorial Sloan-Kettering Cancer Center, New York, NY). *Am J Dig Dis* 21(1): 68-70; 1976.

The occurrence of familial clustering with gastrointestinal cancer prompted a discussion of the hereditary vs. environmental factors in its etiology. The risk of cancer of the colon in relatives of patients with colorectal cancer is probably about three times that expected in the general population. Patients under 40 who develop colorectal carcinoma are more likely to have a family history of colonic cancer than those over 40 who develop the neoplasm. This led to the hypothesis that an individual with hereditary cancer already carries one mutation that may lead to cancer but must get another from an environmental factor to develop the cancer. The patient with the nonhereditary form must acquire two or more mutations, thereby developing cancer later. Experiments using dimethylhydrazine indicated that the events leading to neoplastic transformation in the colon are similar to those occurring in colonic epithelial cells in humans with a genetic predisposition to the disease. This suggests that in both inherited and induced neoplastic disease of the colon a common defect in the regulatory control of cell proliferation exists. (16 references)

0605 THE CIGARETTE SMOKING/LUNG CANCER HYPOTHESIS. (Eng.) Ibrahim, M. A. (Dept. Epidemiology, Univ. North Carolina, Chapel Hill, NC 27514). *Am J Public Health* 66(2): 132-133; 1976.

The development of a scientific policy concerning cigarette smoking in spite of disagreement on the exact relationship between smoking and lung cancer was recommended. That smoking must be included as a causal factor has been shown to the satisfaction of all. Three directions that this policy should take were enumerated: (1) The promotion of antismoking campaigns; (2) The conduct of carefully designed community-based intervention trials to estimate the impact of cessation of smoking on health; and (3) The conduct of studies to elucidate the role of environmental and industrial factors in lung cancer rates. (6 references)

0606 SMOKING AND CANCER; COMMUNICATION FROM HIGGINS (Letter to Editor). (Eng.) Higgins, I. T. (Sch. Public Health, Univ. Michigan, Ann Arbor, MI 48104). *Am J Public Health* 66(2): 159-161; 1976.

The hypothesis that smoking is the major cause of lung cancer was defended by citing data showing that while lung cancer deaths in Britain and Wales have declined (at ages under 65 yr), such deaths in the United States have increased, especially for women. There is evidence that smoking by women has increased since 1950, and probably since 1940 although data from before 1955 is not available for the US. A 10-yr study of the Swedish population (comprising 27,342 men and 27,732 women) showed that the relative risks among cigarette smokers for lung cancer were comparable to those found in other studies. Other US studies were also cited in which factors such as migration, mobility, and urban living were investigated; it was concluded that there was no class that did not have a substantial excess risk among regular cigarette smokers. A study among physicians was mentioned that indicated a decline in lung cancer death rates among those who had reduced smoking but an increase in other men who smoked more. Environmental air pollution can only play a minor role, compared with that of smoking, in the etiology of this disease. It was concluded that while there are other factors than smoking in the etiology of lung cancer, evidence is insufficient to state that smoking is not the major factor. (9 references)

0607 THE CARCINOGENICITY OF ANTICANCER DRUGS: A HAZARD IN MAN. (Eng.) Harris, C. C. (Natl. Cancer Inst., Natl. Inst. Health, Bethesda, MD 20014). *Cancer* 37(2): 1014-1023; 1976.

The carcinogenic potential of anticancer drugs is discussed in the light of selected basic principles of chemical carcinogenesis. Anticancer drugs that act by alkylation and/or by binding tightly to DNA frequently cause cancer in experimental animals and may be carcinogenic in man. In addition, certain anticancer drugs act as cocarcinogens in experimental systems and augment the tumorigenicity of chemical carcinogens. Host determinants are important in chemical carcinogenesis. Many chemical carcinogens and anticancer drugs require metabolic activation by microsomal enzymes. Studies in twins have shown that interindividual variation of drug metabolism in man is greater than intraindividual variation caused by exogenous factors. Therefore, certain individuals may be unusually susceptible to the carcinogenicity of anticancer drugs on a pharmacogenetic basis. Age is also a host determinant. At a given total dose level, age at first exposure to chemical carcinogens has been shown to be an important risk factor in experimental studies and in some epidemiologic investigations in man. Therefore, children may be especially susceptible to the carcinogenicity of anticancer drugs. These treated children have the potential of a normal lifespan; the latency period between initial exposure to a carcinogen and clinical evidence of cancer in man is long, usually 2-5 decades. The problems involved in extrapolating data of carcinogenicity in experimental animals to man are discussed. A single drug may have multiple consequences in experimental studies; for example, actinomycin C can act as an anticancer drug, an anticarcinogen, and a carcinogen. These uncertainties and the clinical results concerning second neoplasms following cancer therapy in both children and adults clearly indicate the need to follow carefully long-term survivors who have received cancer therapy. (97 references)

0608 THE PARABLE OF THE WOUNDED MAN (Letter to Editor). (Eng.) Marcus, S. J. (11 Everett St., Cambridge, MA 02138). *Am J Public Health* 66(2): 181; 1976.

The conclusions drawn in the Environmental Defense Fund's report ''The Implications of Cancer-Causing Substances in Mississippi River Water'' were defended by stressing that regression analyses never provide proof no matter how great the correlation, but rather provide strong indications, because of the complexity of the situation under study. Health effects from chronic, ''low'' levels of pollutants are highly variable; they depend upon genetic, ethnic, racial, sex, socioeconomical, and lifestyle differences, and more. That there was any statistically valid result from the studies showed how strong the indications were. Because carcinogens are known to be present in Mississippi area drinking water the necessary course of action is to eliminate this threat. (2 references)

0609 FIBER FEEDING--FAD OR FINGER OF FATE? (Editorial) (Eng.) Vaisrub, S. (535 N. Dearborn St., Chicago, IL 60610). *JAMA* 235(2): 182; 1976.

The evidence that dietary fiber has a role in the incidence of certain diseases (colonic cancer, diverticulitis, appendicitis, varicose veins, phlebitis, and diabetes) common in Western cultures was reviewed. Epidemiologic observations on cultures south of the Sahara suggests that the high proportion of fiber consumed here, in comparison to that in more industrialized countries, accounts for the lower levels of serum cholesterol and triglycerides seen in these people. Historic support for this suggestion was seen in the rarity of these diseases in medical records prior to the introduction of roller mills in grain processing.

This evidence has been disputed by challenging the studies that extrapolated from people in one geographic region to those in the west, and that ignore changes other than fiber consumption that occur in the transition from rural to urban life. The probable inaccuracies of old medical records was cited. The experimental evidence was challenged on the grounds that it had not been reproduced in other reports. It was concluded that until the benefits of dietary fiber consumption are firmly established, the discomfort and lack of esthetic appeal of such a diet (such as flatulence and the frequent need to eliminate soft, bulky stools) will preclude widespread increase in fiber intake. (10 references)

0610 RISKS VS. BENEFITS IN BREAST CANCER DIAGNOSIS (Editorial). (Eng.) Holleb, A. I. (No affiliation given). *Ca* 26(1): 63-64; 1976.

The carcinogenic risk of radiation exposure secondary to diagnostic mammography is discussed, and a claim that periodic mammography will produce in the next 30 years as many breast cancers as it will detect is disputed. Because radiologists and radiation physicists are vigilant about unnecessary exposure to ionizing radiation, the author contends that the risk of mammography may well have been overstated. The author concludes that the risks of this procedure are far outweighed by its ability to detect extremely early nonpalpable breast cancers in older women, and even in those under 50. (No references)

0611 THE ASSOCIATION BETWEEN SYSTEMICALLY ADMINISTERED RADIOISOTOPES AND SUBSEQUENT MALIGNANT DISEASE. (Eng.) Berlin, N. I. (Northwestern Univ. Medical Sch., Chicago, IL 60611); Wasserman, L. R. *Cancer* 37(2): 1097-1101; 1976.

There is a long history of association of X-radiation with the subsequent development of malignant tumors. For systemically administered isotopes this came into prominence when the association between cancer, particularly of the bone, and ingestion of radioactive isotopes by radium dial painters was discovered. The association was amplified by the development of cancer in patients given thorotrast as a contrast medium for diagnostic radiologic examination. Acute leukemia was reported 30 yr ago in patients with polycythemia vera treated with ^{32}P. Acute leukemia also occurs in patients with polycythemia vera treated only with phlebotomy or drugs. A controlled study is now underway to provide further information on the incidence of acute leukemia in patients with polycythemia vera treated by phlebotomy alone, chlorambucil, or ^{32}P. ^{131}I for the treatment of hyperthyroidism probably does not induce cancer, but in the doses used for thyroid cancer there was an increased incidence of neoplasms (12/200 in one study). This was higher than the expected incidence of neoplasms. The doses of radioactive isotopes used currently for diagnostic purposes have not induced cancer. (26 references)

0612 IMPORTANCE OF INITIAL MANAGEMENT OF PERSONS INTERNALLY CONTAMINATED WITH RADIONUCLIDES. (Eng.) Lincoln, T. A. (Holifield Natl. Lab., Oak Ridge, TN 37830). *Am Ind Hyg Assoc J* 37(1): 16-21; 1976.

The first 1-3 hr following accidental internal radiation contamination is the crucial time for preventing uptake of radionuclides. Absorption can be reduced by using chemical manipulation in the gastrointestinal tract (e.g. by alkylizing the stomach) or by hastening the material through the body (e.g. by magnesium sulfate). Once absorbed, uptake in specific tissues can often be prevented by blocking agents, isotopic dilution or chelating agents. Displacement therapy, a special form of isotopic dilution involving the use of a nonradioactive element of a different atomic number to compete with the radionuclide, can also be used. A table of radionuclide contaminants and medications useful in preventing their uptake is provided. (41 references)

0613 EPIDEMIOLOGICAL IMPLICATIONS OF ANIMAL LEUKEMIA VIRUS MODELS FOR THE HUMAN SITUATION: FORMAL DISCUSSION. (Eng.) Heath, C. W., Jr. (Center for Disease Control, Dept. Health, Education, Welfare, Atlanta, GA 30333). *Cancer Res* 36(2): 589-590; 1976.

A brief review of the behavior of C-type viruses in avian, murine and feline studies is presented, and this information is discussed in relation to human leukemias. The most striking difference among the three animal models is the apparent relative lack of horizontal virus transmission in mice as opposed to birds and cats. The importance of host factors is stressed; this is most clearly seen in the avian model, where viral infection and tumorigenesis are determined by a mixture of genetic makeup, maternal infection, and material immune status. Different combinations of these three factors appear to predict the extent to which Subgroup A virus will produce lymphoid tumor in young chickens. The possible association between lymphoid tumor and paralytic disease, which has been suggested in one murine study, is also discussed. A time-space cluster of three cases of amyotrophic lateral sclerosis is described, and a search for other similar situations in humans is suggested. (7 references)

0614 SYSTEMIC LUPUS ERYTHEMATOSIS AND NEUROFIBROMATOSIS. (Eng.) Bassan, H. M. (Central Emek Hosp., Afula, Israel); Bitnun, S. *Int J Dermatol* 15(1): 36-37; 1976.

A possible connection between systemic lupus erythematosis (SLE) and neurofibromatosis (NF) and features common to both are considered. The possibility that genetic factors, apparent in NF, are also involved in the pathogenesis of SLE is suggested by the variable incidence of the disease (depending on sex and ethnic origin), concordance in twins, and numerous family studies. Pregnancy seems to precipitate and/or aggravate both SLE and

NF. Also, both disorders may show vascular lesions. There is an increased frequency of malignancy in SLE patients; in one large series, more than 10% of SLE patients developed some form of malignancy. Some malignant changes have also been seen in patients with NF; sarcomatous degeneration has been reported in 2-16% of cases, and other malignant tumors have been noted. The data to date strongly implicate chronic viral infection as a cause of SLE; there could be a segment of the population that is prone to drastic changes of the immunologic system which make it susceptible to both tumors and collagen diseases. Viral RNA might be incorporated into the human gene and transmitted through generations. The fact that SLE and NF rarely occur together does not rule out the possibility of some common ground in their pathogenesis. It is suggested that there are factors operating in both diseases which predispose certain individuals to the development of neoplastic or collagen disorders. (8 references)

0615 SERUM FERRITIN, ALPHA$_2$ H GLOBULIN AND MALIGNANT DISEASE (Letter to Editor). (Eng.) Jacobs, A. (Univ. Hosp. Wales, Heath Park, Cardiff CF4 4XN, Wales); Wagstaff, M.; Worwood, M. *Br J Cancer* 32(6): 747-748; 1975.

The similarities between serum ferritin and alpha$_2$ H globulin and their presence in malignant disease are discussed. Alpha$_2$ H globulin is found in the circulation at concentrations of greater than 200 ng/ml at birth, and disappears during the first few weeks of life. In many patients with malignant disease the protein is again found in high concentrations in the plasma. Serum ferritin concentrations follow the same pattern both during the neonatal period and in cancer patients. Both proteins move similarly on cellulose acetate electrophoresis in barbitone buffer at pH 8.6. Both proteins exhibit similar differences in carbohydrate content, iron content, and state of polymerization in preparations from normal and malignant or fetal tissue. It seems likely that both names, alpha$_2$ H globulin and ferritin, describe members of what now seems to be an extensive family of iron-containing proteins generally called ferritins. Further examination of the properties of circulating alpha$_2$ H globulin and ferritin may give more information about the nature of ferritin in malignant tissue, about its release into the circulation, and about immunological relationships between the various proteins. (11 references)

0616 T ANTIGEN AND DNA SYNTHESIS. (Eng.) Mangel, W. F. (No Affiliation Given). *Nature* 260(5551): 482-483; 1976.

Information in support of the hypothesis that tumor (T) antigen is an early virus-coded protein responsible for the induction of cellular DNA synthesis that occurs after infection by papova viruses is presented. The microinjection of early polyoma RNA sequences into the cytoplasms of permissive cells results in a positive immunofluorescence test for T antigen. Microinjection of asymmetrically transcribed simian virus 40 (SV40)-complementary RNA, which contains the early messenger RNA sequences, not only results in T antigen formation but also in the induction of cellular RNA synthesis. The biological activity of this complementary RNA is destroyed by ribonuclease but not by deoxyribonuclease. In experiments in which the four fragments of SV40 DNA produced by the two restriction endonucleases *Hpa*I and *Hpa*II had been individually microinjected into monkey cells, only one fragment induced T antigen synthesis, and none induced V antigen (capsid protein) synthesis. These experiments support the hypothesis that T antigen formation requires early viral RNA sequences, which must be translated. (8 references)

0617 CONDYLOMATA ACUMINATA AND HUMAN GENITAL CANCER. (Eng.) zur Hausen, H. (Institut fuer Klinische Virologie der Universitaet Erlangen-Nuernberg, 852 Erlangen, Loschgestrasse 7, W. Germany). *Cancer Res* 36(2): 794; 1976.

A brief review of literature concerning virus-induced and virus particle-containing genital warts or condylomata acuminata is presented. This tumor has been shown to contain a papilloma virus, which appears to differ from human wart virus when tested biochemically or immunologically. The particles can be detected by electron microscopy in about 50% of all condylomas. Penile carcinomas occasionally develop within or at a site of condylomata acuminata. (21 references)

0618 PROLIFERATION OF MACROPHAGES IN INFLAMMATION. (Eng.) Spector, W. G. (St. Bartholomew's Hosp. Medical Coll., London, England); Wynne, K. M. *Agents Actions* 6(1-3): 123-126; 1976.

Proliferation of macrophages in chronic inflammatory loci is an essential part of granuloma development, and helps to defend the host against dissemination of harmful microorganisms. Its induction seems to depend in part on local appearance of soluble mitogenic factors, since sterile cell-free exudates induce mitotic activity in vitro in a macrophage population otherwise unable to divide. Macrophage proliferation is probably checked and controlled by inherent restrictions on the number of divisions possible. This in turn probably depends on the rapid appearance of gross chromosomal defects, the effete cells being eliminated by their incorporation into multinucleate giant cells that then form nonviable polyploid cells. (6 references)

0619 ECTOPIC PRODUCTION OF HCG SUBUNITS. (Eng.) Anonymous. (No affiliation given). *Nature* 260(5551): 480-481; 1976.

Information concerning the ectopic production of human chorionic gonadotropin (HCG) in certain tumors is reviewed. HCG is found in the circulation of patients with choriocarcinoma, hydatidiform mole, and in patients with cancers that ectopically synthesize the hormone. The two HCG subunits, α-HCG and β-HCG, are synthesized and secreted by HeLa cells in culture. The α subunit secreted in large amounts by these cells is immunologically indistinguishable from the α subunit isolated from pregnancy urine. It is apparently not structurally identical, however, because a small but definite difference has been found in elution of the subunit during gel filtration compared with the pregnancy subnit. The α subunit isolated from Gha-Go tumor cannot form biologically active HCG when incubated with the β subunit, whereas the α subunit from pregnancy urine can. (12 references)

0620 NEUROTRANSMITTER METABOLISM IN MURINE NEUROBLASTOMA CELLS. (Eng.) Breakefield, X. O. (Yale Univ. Sch. Medicine, New Haven, CT 06510). *Life Sci* 18(3): 267-278; 1976.

Information dealing with neurotransmitter metabolism in murine neuroblastoma cells is reviewed. Murine neuroblastoma cells in culture are able to synthesize the putative neurotransmitters--acetylcholine, dopamine, norepinephrine, tyramine, octopamine, histamine, serotonin and gamma-aminobutyric acid (GABA). They possess not only synthetic, but also degradative enzymes involved in metabolism of these transmitters, and many of these enzymes increase in activity as the cells ''differentiate.'' Catecholamines, and perhaps other transmitters, appear to be stored within membrane-limited vesicles which accumulate within the process endings of these cells. Uptake of GABA, glycine, dopamine, and norepinephrine shows characteristics of the high affinity transport systems observed in other neuronal populations; uptake of choline and other amino acids is similar to that in nonneuronal populations. Cells show receptor sensitivities to acetylcholine, dopamine, norepinephrine, prostaglandins E_1, and morphine, as demonstrated by electrophysiologic, toxin binding, and cyclic nucleotide studies. (90 references)

0621 HEALTH PROBLEMS OF THE CHEMICAL INDUSTRY. (Eng.) Pelnar, P. V. (Inst. Occupational and Environmental Health, Montreal, Quebec, Canada). *Chem Can* 28(3): 14-15; 1976. (6 references)

0622 HOW GENES MAY AFFECT SUSCEPTIBILITY TO CANCER. (Eng.) Anonymous (no affiliation given). *New Sci* 15(70): 129; 1976. (No references)

0623 CYTOGENETICS OF HUMAN NEOPLASMS (abstract). (Eng.) Mitelman, F. (Univ. Hosp., Lund, Sweden). *Hereditas* 81(2): 294; 1975. (No references)

0624 TOBACCO AND TOBACCO SMOKE. (Eng.) Wynder, E. L. (American Health Foundation, 1370 Avenue of the Americas, New York, NY 10019); Hoffmann, D. *Semin Oncol* 3(1): 5-15; 1976. (27 references)

0625 THE LYMPHOCYTE PLASMA MEMBRANE: LOCUS OF CONTROL IN THE IMMUNE RESPONSE. (Eng.) Jerry, L. M. (Cancer Res. Unit, McGill Univ., Montreal, Quebec, Canada, H3C-3G1); Sullivan, A. K. *In Vitro* 12(3): 236-259; 1976. (253 references)

0626 A HEMATOLOGIST'S APPRAISAL OF THE PROBLEM OF CEREBRAL LYMPHOMAS IN TRANSPLANTED PATIENTS: A SPECULATIVE REVIEW. (Eng.) Marmont, A. M. (via C. Cabella 1, 16122 Genova, Italy). *Haematologiga* 59(4): 489-498; 1974. (58 references)

0627 AUTOANTIBODIES IN BREAST CANCER. (Eng.) Anonymous. (No affiliation given). *Br Med J* 1(6004): 244; 1976. (18 references)

0628 BATSON'S THEORY OF VERTEBRAL VENOUS METASTASIS: A REVIEW. (Eng.) Onuigbo, W. I. B. (General Hosp., Enugu, Nigeria). *Oncology* 32(3-4): 145-150; 1975. (57 references)

0629 ACTION OF CYCLIC ADENOSINE-3'-5'-MONOPHOSPHATE ON THE PROLIFERATION AND DIFFERENTIATION OF HEMOPOIETIC CELLS (LITERATURE REVIEW). (Rus.) Fedorov, N. A. (Central Inst. Hematology and Blood Transfusion, Ministry of Public Health of the USSR, Moscow, USSR); Kostrova, A. A. *Probl Gematol Pereliv Krovy* 20(9): 49-55; 1975. (53 references)

0630 THE PRODUCTION OF *N*-NITROSOIMINODIACETATE FROM NITRILOTRIACETATE AND NITRATE BY MICROORGANISMS GROWING IN MIXED CULTURE. (Eng.) Pickaver, A. H. (Dept. Microbiology, Trinity Coll., Dublin, Ireland). *Soil Biol Biochem* 8(1): 13-17; 1976.

Experiments were conducted to determine if mixed populations of microorganisms growing in a recycling soil percolator can produce N-nitrosoiminodiacetate (NIDA) after 30 days growth using sodium nitrilotriacetate (NTA), a detergent additive, and NaNO$_3$ as C and N source, respectively. Control experiments using autoclaved soil or substituting either acetate (C source) or NH$_4$+ (N source) did not show any N-nitroso derivative production. Five distinct strains of microorganisms (3 strains of *Pseudomonas*, a *Bacillus* species, and a yeast) were isolated which could grow on an NTA/NO$_3^-$ minimal medium but none produced NIDA in pure culture. Mixed cultures of two strains of *Pseudomonas* produced NIDA after 4 days percolation, using glass beads as a support. Cell-free extracts of the mixed cultures synthesized NIDA after 30 min incubation at 30 C with an activity of 27 μmoles NIDA produced/mg protein/hr. Physical separation of the two organisms and the cell-free extracts by a dialysis membrane in a chamber determined that only one of the two organisms was responsible for the synthesis of NIDA, but the production was dependent upon the presence of the other organism. The authors suggest that the later organism may be synthesizing a small molecular weight co-factor which activates synthesis of NIDA in the producer strain.

0631 EXPERIMENTAL BILHARZIAL BLADDER CANCER: TRYPTOPHAN METABOLISM IN NONHUMAN PRIMATES EXPERIMENTALLY INFECTED WITH *SCHISTOSOMA HAEMATOBIUM*. (Eng.) Brown, R. R. (Univ. Wisconsin Center Health Sci., 1300 University Ave., Madison, WI 53706); Kuntz, R. E.; Arend, R. A.; Moore, J. A.; Huang, T.-C. *J Natl Cancer Inst* 56(1): 101-104; 1976.

The tryptophan metabolism was studied in nonhuman primate species infected with *Schistosoma haematobium* which provided a model system for controlled studies on bilharzial bladder cancer. The excretion of tryptophan metabolites in the basal urine from capuchin monkeys (*Cebus apella*) and African baboons (*Papio cynocephalus*), expressed as μmoles/g creatine, was compared with values from normal humans. Excretion of all measured metabolites was similar in both species; however, levels of kynurenine, kynurenic acid, and anthranilic acid glucuronide were several-fold greater in the capuchin urine. Urinary excretion of tryptophan metabolites by capuchin monkeys was similar to that of humans. Liver tryptophan oxygenase activity of the capuchin monkeys was comparable to that of humans. Excretion of 3-hydroxykynurenine and 3-hydroxyanthranilic acid was elevated above control levels in capuchin monkeys infected experimentally with *S. haematobium*. The authors conclude that the capuchin-*S. haematobium* system closely resembles the human bilharziasis system and offers a reproducible laboratory model system for the controlled study of the parasitology, pathogenesis, and biochemistry of bilharzial bladder cancer.

0632 ACCUMULATION OF POLYCYCLIC AROMATIC HYDROCARBONS IN CULTIVATED MICROALGAE. (Eng.) Payer, H. D. (Gesellschaft fuer Strahlen- und Umweltforschung mbH, Munchen, Abteilung fuer Algenforschung und Algentechnologie, Dortmund, W. Germany); Soeder, C. J.; Kunte, H.; Karuwanna, P.; Nonhof, R.; Graef, W. *Naturwissenschaften* 62(2): 536-537; 1975.

A study was undertaken to determine if the green algae, *Scenedesmus acutus*, accumulate higher amounts of polycyclic aromatic hydrocarbons in industrial areas than in rural areas, in a manner similar to terrestrial plants. The algae were grown in ponds either in Dortmund or Bangkok. The quantitative determination of 3,4-benzopyrene, 3,4-benzofluoranthene, indenopyrene, fluoranthene, 1,12-benzoperylene, and 11,12-benzofluoranthene were carried out on two-dimensional thin-layer chromatograms and on reference chromatograms. The polycyclic hydrocarbon concentrations in Bangkok were lower than those from Dortmund. The investigation showed that it is possible to produce microalgae with a load of environmental pollutants no higher than that of terrestrial plants.

0633 BIOLOGIC EFFECTS OF PLANT TOXINS AND AFLATOXINS IN RATS. Eng.) Newberne, P. M. (Dept. Nutrition and Food Science, Massachusetts Inst. Technology, Cambridge, MA 02139). *J Natl Cancer Inst* 56(3): 551-555; 1976.

Charles River Sprague-Dawley rats were fed, after weaning, a semipurified diet containing either fiddlehead greens (from the ostrich fern *Matteuccia struthiopteris*), mature bracken fern (*Pteridium aquiliinum*), cycad meal (*Cycas circinalis* C), or aflatoxin B$_1$. The groups fed 1-10% fiddlehead greens for 70-73 wk developed no tumors, whereas those fed mature bracken fern for 67 wk developed small-bowel adenocarcinomas (3 of 17). Those fed 3% cycad meal for 64 wk developed tumors of the liver (4 of 18). Those given aflatoxin B$_1$ and observed for 73 wk developed liver tumors (11 of 15). The results indicate that fiddlehead greens from *M. struthiopteris* are not toxic or carcinogenic.

0634 CARCINOGEN-INDUCED DNA REPAIR IN PRIMARY RAT LIVER CELL CULTURES: A POSSIBLE SCREEN FOR CHEMICAL CARCINOGENS. (Eng.) Williams, G. M. (Naylor Dana Inst. Disease Prevention, American Health Foundation, Valhalla, NY 10595). *Cancer Lett* 1(4): 231-236; 1976.

Primary Fischer rat liver cell cultures were exposed to a direct acting carcinogen, methyl methanesulfonate, and procarcinogens requiring metabolic activation, aflatoxin B$_1$ and B$_2$. DNA damage by these agents was evidenced by the induction of DNA repair, measured as unscheduled DNA synthesis. The sensitivity of these cultures to aflatoxin B_1 indicates that this system may be adapted for screening suspected chemical procarcinogens, and for investigating the relationship among metabolic activation of procarcinogens, DNA damage, DNA repair, and carcinogenicity.

0635 DEGRADATION OF AFLATOXIN B_1 BY MICROORGANISMS. (Eng.) Mann, R. (Institut fuer Mikrobiologie, Universitaet Muenster, Muenster, W. Germany); Rehm, H. J. *Naturwissenschaften* 62(2): 537-538; 1975.

The ability of various bacteria, yeasts, and molds to degrade aflatoxin B_1 was studied. *Corynebacterium rubrum* degraded over 99% of the added aflatoxin (1.48 μg/ml) in a liquid culture after four days. Other bacteria including *Escherichia coli*, *Bacillus mycoides*, and *Corynebacterium betae* apparently caused no degradation. Anascosporogenous yeasts (*Candida* sp.) degraded at least 80% aflatoxin within 20 days, whereas ascosporogenous yeasts (*Saccharomyces*) were inactive. *Cunninghamella echinulata*, *Tachybotrys lobulata*, *Penicillium islandicum*, *Aspergillus niger* and *A. ochraceus* all degraded aflatoxin, and only *Fusarium aquaeductum* showed little activity.

0636 DNA EXCISION-REPAIR DEFICIENCY OF HUMAN PERIPHERAL BLOOD LYMPHOCYTES TREATED WITH CHEMICAL CARCINOGENS. (Eng.) Scudiero, D. (Natl. Cancer Inst., Natl. Insts. Health, Bethesda, MD); Norin, A.; Karran, P.; Strauss, B. *Cancer Res* 36(4): 1397-1403; 1976.

Human peripheral blood lymphocytes stimulated with concanavalin A for 72 hr have a 10-fold greater capacity to repair DNA damage induced by N-acetoxy-2-acetylaminofluorene than do unstimulated cells. The maximum rate of repair synthesis obtained after treatment of stimulated cells with the "large patch"-inducing agent, N-acetoxy-2-acetylaminofluorene, is twice that obtained with methyl methanesulfonate, an agent inducing "small patch" repair. The difference between the maximum rates obtained with N-acetoxy-2-acetylaminofluorene and methyl methanesulfonate is six-fold in a human lymphoblastoid line. Unstimulated lymphocytes show almost identical rates of repair after treatment with either N-acetoxy-2-acetylaminofluorene or methyl methanesulfonate. There is close correlation between the rate of N-acetoxy-2-acetylaminofluorene-induced repair synthesis and the loss of acetylaminofluorene adducts from DNA. Treatment of lymphocytes with methyl methanesulfonate leads to degradation of cellular DNA with the production of single-stranded regions. Such degradation is not observed with N-acetoxy-2-acetylaminofluorene. It is concluded that the rate of excision repair is a function of the capacity of cells for DNA synthesis and that lymphocytes that do not synthesize DNA have a limited repair capacity and cannot be used to distinguish between large and small patch repair.

0637 ISOLATION OF AN INHIBITOR OF *ASPERGILLUS PARASITICUS* FROM WHITE POTATOES (*SOLANUM TUBEROSUM*). (Eng.) Swaminathan, B. (Food Science Dept., Univ. Georgia, Athens, GA 30602); Keohler, P. E. *J Food Sci* 41(2): 313-319; 1976.

The growth of *Aspergillus parasiticus* on white potatoes was studied; when it was discovered that the potato was resistant to infection by *A. parasiticus*, the chemical compounds occurring in potato credited with fungitoxic activity were tested for their effect on growth and toxin production by this mold. White potatoes did not support the growth of *A. parasiticus* NRRL 2999 unless they were heated to above 60 C. The mold grew well on autoclaved potatoes and produced an average of 8 μg/g total aflatoxins (mainly B_1 and G_1) at 27 C and 95-97% relative humidity in 20 days. When soluble potato starch was substituted for sucrose in yeast extract-sucrose (YES) medium, the maximum growth of *A. parasiticus* was 80% of that observed in YES medium, but total aflatoxin production was only 0.5-1.0% of the production in YES medium. Chlorogenic acid and solanine, at levels normally found in the white potato, did not show appreciable fungitoxic activity toward *A. parasiticus* in vitro. Caffeic acid (0.01 M) partially inhibited the growth of *A. parasiticus* and the production of aflatoxins. A compound with high inhibitory activity toward *A. parasiticus* was isolated from the potatoes with ethyl acetate. From its behavior on thin-layer chromatography systems, its UV spectrum, and its reactions with chromogenic spray reagents, it is inferred that the compound is phenolic in nature. It appears to be a hydroxy-cinnamic acid derivative structurally similar to caffeic acid but lacking the ortho-dihydroxy structure of caffeic acid.

0638 REGULATION OF ESTROGEN RECEPTORS IN OVARIAN-DEPENDENT RAT MAMMARY TUMORS. I. EFFECTS OF CASTRATION AND PROLACTIN. (Eng.) Vignon, F. (Unite d'Endocrinologie Cellulaire et Moleculaire, I.N.S.E.R.M. U 148, Univ. de Montpellier, Avenue des Moulins, 34000 Montpellier, France); Rochefort, H. *Endocrinology* 98(3): 722-729; 1976.

Ovarian dependent rat mammary tumors, induced by 9,10-dimethyl-1,2-benzanthracene in female Sprague-Dawley rats, were assayed for their estrogen receptor content by dextran-coated charcoal adsorption and sucrose gradient ultra-centrifugation. The estradiol receptors bound estrogens with a high affinity, limited capacity and high specificity, and sedimented at 8 S in a sucrose gradient. The cytosol receptors were transferred to the nucleus after binding to estrogens either in vivo or in vitro. The tumor area regressed by 70% during the first 10 days after spaying while the concentration of estradiol cytosol receptors decreased from 225 to 16 fmoles/mg of protein. Three to five days after in vivo administration of estradiol (2 μg daily) or prolactin (1 mg daily) the concentration of estrogen receptors was increased in spayed rats. In biopsy experiments, prolactin, but not estradiol, increased the estrogen receptor concentration when endogenous prolactin release was blocked by CB 154. Prolactin did not modify the intracellular distribution of the estrogen receptor or its binding affinity for estrogen. The uterine estrogen receptor sites were not modified by prolactin under the same conditions. It is suggested that in mammary tumors prolactin sensitizes the action of estrogens at the target level by increasing the concentration of their available receptor sites.

0639 HORSERADISH PEROXIDASE/HYDROGEN PEROXIDE-CATALYZED OXIDATION OF THE CARCINOGEN N-HYDROXY-N-ACETYL-2-AMINOFLUORENE AS EFFECTED BY CYANIDE AND ASCORBATE. (Eng.) Floyd, R. A. (Oklahoma Medical Res Foundation, 825 Northeast 13 St., Oklahoma City, OK 73104); Soong, L. N.; Culver, P. L. *Cancer Res* 36(4): 1510-1519; 1976.

The horseradish peroxidase/N-hydroxy-N-acetyl-2-aminofluorene (N-OH-AAF)/H_2O_2 system was studied by absorbance spectroscopy. The results indicated that horseradish peroxidase was operating as a peroxidase with N-OH-AAF as the electron donor. The studies confirmed the earlier finding that 2-nitrosofluorene and N-acetoxy-N-acetyl-2-aminofluorene are the products of the type II enzyme-mediated oxidation of N-OH-AAF, but surprisingly, the results with the type VI enzyme indicated that more 2-nitrosofluorene was formed and, in addition, another product absorbing at 245 nm was formed. If ascorbate was present in the system, it was oxidized preferentially. Cyanide, a known inhibitor of the peroxidase, did not inhibit when N-OH-AAF was the electron donor. The reaction products were the same in the presence or absence of cyanide.

0640 CARCINOGEN-INDUCED DNA REPAIR IN NUCLEOTIDE-PERMEABLE *ESCHERICHIA COLI* CELLS. ANALYSIS OF DNA REPAIR INDUCED BY THE CARCINOGENS N-ACETOXY-N-2-ACETYLAMINOFLUORENE AND 7-BROMOMETHYL-BENZ[a]ANTHRACENE. (Eng.) Thielmann, H. W. (Deutshces Krebsforschungzentrum, Institut fuer Biochemie, Heidelberg, W. Germany). *Eur J Biochem* 61(2): 501-513; 1976.

Upon exposure to the carcinogens N-acetoxy-N-2-acetylaminofluorene and 7-bromomethyl-benz[a]anthracene, which bind covalently to DNA, ether-permeabilized *Escherichia coli* wild-type cells responded with DNA excision repair. This repair was missing in mutants carrying defects in genes uvrA, uvrB and uvrC, but was present in uvrD and several rec mutants. Enzymic activities involved were identified by measuring repair polymerization and size reduction of denatured DNA. Carcinogen-induced repair polymerization initiated by N-acetoxy-N-2-acetylaminofluorene or 7-bromomethyl-benz[a]anthracene, depended upon an ATP-requiring step; CTP, GTP or UTP did not substitute for ATP. DNA repair synthesis was inhibited by p-chloromercuribenzoate and quinacrine. In uvrA, uvrB, and uvrC mutants no carcinogen-stimulated DNA synthesis could be detected, indicating that steps involved in pyrimidine dimer excision are also involved in chemorepair. In recA, recB and recC mutant cells, repair synthesis was stimulated by the carcinogens to a normal extent. This indicates that ATP-dependent recB,C deoxyribonuclease and recA gene products do not play an important role in carcinogen-induced excision repair. $PolA_1$ cells showed drastically reduced levels of repair polymerization, indicating that DNA polymerase I is the main polymerizing enzyme. As determined by DNA size reduction in alkaline sucrose gradients, the arylalkylating carcinogens caused endonucleolytic cleavage of endogenous DNA in wild-type cells. This incision step was most effectively performed in the presence of ATP; UTP, CTP and GTP were only slightly effective. Incision was inhibited by p-chloromercuribenzoate and quinacrine. When exposed to the arylalkylating carcinogens, uvrA, uvrB and uvrC mutant cells did not perform the incision step in the presence of ATP, suggesting the involvement of the respective gene products in the initiation of chemorepair.

0641 MICROSOME CATALYZED CONVERSION OF N-HYDROXY-N-ACETYL-2-AMINOFLUORENE BY CUMENE-HYDROPEROXIDE. (Eng.) Floyd, R. A. (Oklahoma Medical Res. Foundation, Oklahoma City, OK 73104). *Life Sci* 18(2): 189-195; 1976.

It was demonstrated that the microsomal fraction of rat liver in the presence of cumene-hydroperoxide catalyzed the disappearance of the carcinogen N-hydroxy-N-acetyl-2-aminofluorene. Optical spectroscopy showed that the carcinogen disappearance corresponded kinetically with an absorption increase at 340 nm. The compound(s) absorbing at 340 nm was not identified. The microsomal catalyzed reaction was heat labile, manifested a reaction rate which was proportional to microsomal protein content, and had a Km of 2.6 μM for the carcinogen in the presence of a large excess of cumene-hydroperoxide.

0642 RNA SYNTHESIS AND RNA POLYMERASE ACTIVITY IN HEPATIC NUCLEI ISOLATED FROM RATS FED THE CARCINOGEN 2-ACETYLAMINOFLUORENE. (Eng.) Adams, M. P. (Dept. Pharmacology, Michigan State Univ., East Lansing, MI 48824); Goodman, J. I. *Biochem Biophys Res Commun* 68(3): 850-857; 1976.

An assessment was made of the activity of RNA polymerase I and the capacity for RNA synthesis, under optimal conditions, in hepatic nuclei isolated from male Sprague-Dawley rats fed a diet containing the hepatic carcinogen 2-acetylaminofluorene (AAF). Animals were maintained on the carcinogenic diet for either 4, 7, or 14 days. RNA polymerase activity progressively increased with time; however, the capacity for RNA synthesis remained quite constant. These results suggest a progressive inhibition of DNA template activity during the early stages of AAF-induced hepatocarcinogenesis. The ''permanence'' of the increase in polymerase activity was examined by switching carcinogen-fed animals to a control diet for either

2 or 5 days prior to making an assessment of the above parameters. Five days after being switched to the control diet, RNA polymerase activity returned to control values in those animals fed the AAF diet for either 4 or 14 days. However, the activity remained elevated in those animals fed the AAF diet for 7 days.

0643 DECREASED INCIDENCE OF RENAL CELL CARCINOMA IN RATS WITH ONE KIDNEY INGESTING N-4-(4'-FLUOROBIPHENYL)ACETAMIDE. (Eng.) Reuber, M. D. (11014 Swansfield Road, Columbia, MD 21044). *Experientia* 32(2): 218-219; 1976.

The incidence of renal lesions in Buffalo strain male rats ingesting N-4-(4'-fluorobiphenyl)acetamide was studied to compare rats with both kidneys to those with only one, to determine if reducing the amount of target tissue for this carcinogen increased the likelihood of tumor growth. The carcinogen-containing (0.04%) diet was fed ad libitum continuously for 36 wk. After the 48th wk surviving rats were killed. Uninephrectomized rats survived for an average of 44 wk, and intact rats lived for an average of 48 wk. Nine out of 16 intact rats had kidney carcinomas, as compared to three of 17 uninephrectomized rats. Tumors of this latter group were 5 mm or less in diameter. Hyperplastic renal nodules were found in six intact and five uninephrectomized rats. Seven of 16 intact rats also had liver cancer (5 mm in size or smaller). Uninephrectomized rats showed large liver carcinomas (in 13 of 17 animals). It is not known why reducing the amount of target tissue did not increase the incidence of renal lesions.

0644 DIMETHYL SULFOXIDE-INDUCED ENHANCEMENT OF 7,12-DIMETHYLBENZ[a]ANTHRACENE METABOLISM AND DNA BINDING IN DIFFERENTIATING MOUSE EPIDERMAL CELL CULTURES. (Eng.) Yuspa, S. H. (Div. Cancer Cause and Prevention, Natl. Cancer Inst., Bethesda, MD 20014); Hennings, H.; Dermer, P.; Michael, D. *Cancer Res* 36(3): 947-951; 1976.

The biochemical alterations induced by dimethyl sulfoxide (DMSO) on DNA binding and the metabolism of 7,12-dimethylbenz[a]anthracene (DMBA) was investigated in differentiating mouse epidermal cell culture. Mouse epidermal cells isolated from newborn BALB/c mice in primary culture differentiate rapidly over a 2-week period leading to keratinization and sloughing of most of the plated cells. Cell replication was partially synchronized in these cultures with peaks of DNA synthesis (as measured by [^{3}H]thymidine uptake) at the second and eighth day. The ability of epidermal cells to metabolize DMBA and the subsequent binding of activated products to epidermal DNA was a function of the culture time. Constitutive and induced levels of aryl hydrocarbon hydroxylase in cells cultured for 10 days were half of those in cells grown for 3 days. Likewise, DMBA binding to epidermal DNA was two- to four-fold lower in 10-day than 3-day cultures. This decrease in metabolism and binding between 3-day and 10-day cultures could be eliminated by the inclusion of 1.25% DMSO in the culture medium during the entire culture period. The relatively rapid decrease in the ability of epidermal cells to metabolize and bind DMBA in culture suggests that maturation within the epidermal population alters critical enzyme systems. The results demonstrate that DMSO is not an inducer, and may act by altering in vitro differentiation in epidermal cultures.

0645 SPECIFIC PROGESTERONE RECEPTORS IN DIMETHYLBENZANTHRACENE (DMBA)-INDUCED MAMMARY TUMORS. (Eng.) Asselin, J. (Medical Res. Council Group Molecular Endocrinology, Centre Hospitalier de l'Universite Laval, Quebec G1V 4G2, Canada); Labrie, F.; Kelly, P. A.; Philibert, D.; Raynaud, J.-P. *Steroids* 27(3): 395-404; 1976.

Properties of a progesterone receptor present in the cytosol (105,000 x g supernatant) of dimethylbenzanthracene-induced mammary tumors were studied using the highly potent progestin [^{3}H]R 5020 (17,21-dimethyl-19-nor-pregna-4,9-diene-3,20-dione). As shown by sucrose gradient analysis, specific binding of [^{3}H]R 5020 is associated with components migrating at 7-8S and 4S. Low affinity binding of the synthetic progestin is eliminated by treatment with dextran-coated charcoal. [^{3}H]R 5020 binding is highly progestin-specific since it is easily displaced by unlabeled norgestrel, R 5020 and progesterone while estradiol-17β, dihydrotestosterone, testosterone and diethylstilbestrol have much lower activity. Dexamethasone and cortisol have little, if any, effect on [^{3}H]R 5020 binding. It should be noted that there is a decrease in the level of receptors for progesterone, which stimulates tumor growth, after ovariectomy, a treatment associated with regression of the tumors.

0646 REGRESSION KINETICS OF MOUSE SKIN PAPILLOMAS. (Eng.) Burns, F. J. (New York Univ. Medical Center, New York, NY 10016); Vanderlaan, M.; Sivak, A.; Albert, R. E. *Cancer Res* 36(4): 1422-1427; 1976.

The persistence and proliferation rate of mouse skin papillomas were studied in HA/ICR mice initiated with 7,12-dimethylbenz(a)anthracene and promoted three times weekly with phorbol myristate acetate. When the promoter treatments were stopped, rapid (half-time, 24 days) and slow (half-time, over 140 days) components of papilloma regression were observed. When the promoter dose was increased, there was an increase among the rapidly regressing papillomas. Increases in the epidermal pulse-labeling index and the number of dermal inflammatory cells produced by phorbol myristate acetate in normal skin were reversible when the phorbol myristate acetate was stopped, but high pulse-labeling index values in papillomas were not reversible. Antithymocyte serum had no effect on regression, although ethylphenylpropriolate, a nonpromoting irritant, slowed the regression sufficiently to increase the half-time from 24 to 57 days. The action of the promoter in overcoming the regression tendency of the papillomas may explain certain features of the role of nonspecific irritation and the importance of promotion frequency in determining tumor yield.

0647 CHANGES IN MORPHOLOGY AND HORMONE DEPENDENCY FOLLOWING TRANSPLANTATION OF RAT 9,10-DIMETHYL-1,2-BENZANTHRACENE-INDUCED MAMMARY ADENOCARCINOMA. (Eng.) Horn, H. (Hebrew Univ.-Hadassah Medical Sch., P.O. Box 1172, Jerusalem, Israel); Erlichman, I.; Geier, A.; Levij, I. S. *Eur J Cancer* 12(3): 189-194; 1976.

The hormone dependency of three 9,10-dimethyl-1,2-benzanthracene (DMBA)-induced mammary adenocarcinomas (I, II, and III) and of three transplanted generations derived from them was examined in inbred female Lewis rats. Tumor I and its three successively transplanted generations did not regress after castration. Tumor II regressed after castration as did 7 out of 8 tumors in the first transplanted generations; in the second and third transplanted generations all tumors became hormone-independent. Tumor III regressed after castration and progressed after estradiol-17β administration; however, the three transplanted generations were not hormone-dependent. In addition to becoming hormone-independent, the transplanted tumors underwent histological changes, namely the appearance of cellular stroma and fibrosarcoma in what were originally carcinomatous tumors. In order to examine the possibility that the histological changes observed in the transplants from tumors I, II and III were the result of castration or of estradiol-17β administration, two other DMBA-induced adenocarcinomas (tumors IV and V) were transplanted without any hormonal treatment. Since cellular stroma with small areas of fibrosarcoma appeared in one of the transplants of these tumors, it seems that the above histological changes were not caused by hormonal treatment.

0648 MAST CELLS IN THE SKIN OF NORMAL, HAIRLESS AND ATHYMIC MICE. (Eng.) Keller, R. (Institut fuer Medizinische Mikrobiologie, Arbeitsgruppe fuer Immunobiologie, Schoenleinstrasse 22, CH-8032 Zurich, Switzerland); Hess, M. W.; Riley, J. F. *Experientia* 32(2): 171-172; 1976.

Skin reactions and mast cell responses following topical application of a chemical carcinogen were examined in normal Balb/c mice, in athymic nu/nu mice, and in "hairless" hr/hr mice. Mice were painted twice (seven days apart) with 0.2 ml of a 0.25% solution of 7,12-dimethylbenz(a)anthracene (DMBA) in acetone. Three months after painting, mast cell counts were taken, and several assays were performed: 5-hydroxytryptamine (5-HT) fluorescence, histamine, and the capacity to bind reaginic antibody. Two strains, hr/hr and nu/nu, showed no reaction, either immediate or long-term, to the carcinogen. Nu/nu mice had many mast cells. Normal Balb/c mice reacted with a large increase in the number of mast cells (normally few in number for these mice), with inflammation and epilation by the seventh day. By three months, 20 of the 22 surviving Balb/c mice had papillomatous skin tumors. The findings for histamine paralleled the mast cell count. Mast cells from all three groups displayed golden-brown fluorescence. Receptors for reaginic antibody were undiminished. It was suggested that scarcity of hair follicles and thickened interfollicular epidermis correlated with insensitivity to the carcinogen. Also, the rich mast cell count in athymic nu/nu mice demonstrates that mast cells cannot be the end stage of the T-lymphocyte, as proposed previously.

0649 EFFECTS OF ESTRADIOL AND PROLACTIN ON GROWTH OF RAT MAMMARY ADENOCARCINOMA CELLS IN MONOLAYER CULTURES (39210). (Eng.) Chan, P.-C. (Naylor Dana Inst. Disease Prevention, American Health Foundation, Valhalla, NY 10595); Tsuang, J.; Head, J.; Cohen, L. A. *Proc Soc Exp Biol Med* 151(2): 362-365; 1976.

The effects of estradiol and ovine prolactin on the growth of a 7,12-dimethylbenz(a)anthracene-induced rat mammary adenocarcinoma cell line were investigated. The action of estradiol was dose-dependent. At 1 μg/ml or less, it did not influence growth; at 5-10 μg/ml it was inhibitory; and at 20 μg/ml it was toxic. At concentrations under 100 μg/ml, prolactin alone had little effect on growth. However, the inhibitory effect of estradiol could be counteracted by a high concentration of prolactin (50-100 μg/ml). It appears, therefore, that the growth of cultured rat mammary adenocarcinoma cells can be regulated by the ratio of prolactin to estradiol: when the ratio is high, growth is favored; when it is low, growth is inhibited.

0650 INHIBITION BY 2,4-DINITROPHENOL OF 9,10-DIMETHYL-1,2-BENZANTHRACENE CARCINOGENESIS IN THE HAMSTER CHEEK POUCH. (Eng.) Levij, I. S. (Hadassah Univ. Hosp., Jerusalem, Israel); Rubin, D. *Oncology* 31(5-6): 334-337; 1975.

The effects of topical treatment of cheek pouches of 10 male Syrian hamsters with 9,10-dimethyl-1,2-benzanthracene (DMBA) and 2,4-dinitrophenol (DNP) at 0.5 DMBA to 0.4 g DNP in liquid paraffin for 10 weeks were observed. No carcinomas developed in any of the animals. After treatment of 10 animals with the carcinogen only, there were 49 carcinomas in the eight survivors. Inhibition of chemical carcinogenesis by DNP was tentatively attributed to suppression of ATP synthesis and to activation of ATPase by DNP.

0651 RESPIRATORY RETENTION OF INHALED TOLUENE AND BENZENE IN THE DOG. (Eng.) Egle, J. L., Jr. (Medical Coll. Virginia, Virginia Commonwealth Univ., Richmond, VA); Gochberg, B. J. *J Toxicol Environ Health* 1(3): 531-538; 1976.

The inhalation of toluene and benzene found in the vapor phase of cigarette smoke was studied in mongrel dogs. The uptake of each substance by the total respiratory tract and by the upper and lower portions (1- and 2-way experiments) was determined.

Changes in concentration inhaled (0.37-0.82 μg/ml) appeared to have no influence on retention. Retention by the total tract of toluene fell within the range of 91-94% at all ventilatory rates seen, indicating no relationship between rate and retention. With benzene, total tract retention varied from 88 to 68%, with an apparent inverse relationship between retention and rate, seen in all types of experiments conducted with benzene. Upper tract retention revealed an uptake of about 89% for both 1- and 2-way experiments with toluene. In the benzene experiments retention varied from 80 to 61% and from 81 to 63% in the one- and two-way procedures, respectively. Mean lower tract retention was 90% with toluene at all ventilatory rates considered. Benzene retention varied from 74 to 61% as the rate increased from 6 to 18 inhalations/min.

0652 N-ACETYLATION AS A ROUTE OF 2,4-TOLUENEDIAMINE METABOLISM BY HAMSTER LIVER CYTOSOL. (Eng.) Glinsukon, T. (Faculty of Science, Rama 6th Road, Bangkok, Thailand); Benjamin, T.; Grantham, P. H.; Lewis, N. L.; Weisburger, E. K. *Biochem Pharmacol* 25(1): 95-97; 1976.

The metabolism of 2,4-toluenediamine was studied in vitro in the presence of unlabeled acetyl-CoA, acetyl-[1-^{14}C]CoA and hamster liver cytosol. Incubation mixtures contained 4.0 μM substrate, 1.0 μM equal to CoA containing acetyl-[1-^{14}C]CoA (0.25 μCi), and Syrian hamster liver cytosol equivalent to 50 mg wet weight of liver. The products were separated by thin-layer chromatography, and their identities were confirmed by gas chromatography and mass spectrometry. The cytosol N-acetylated the p-amino groups of 2,4 toluenediamine to a much greater extent than the o-amino group, yielding the major product 4-acetylamino-2-aminotoluene. The cytosol had an even lower ability to N-acetylate the o-amino group of 4-acetylamino-2-aminotoluene and 2-amino-4-nitrotoluene. 2-Acetylamino-4-toluene was also N-acetylated appreciably during a long incubation period (up to 30 min), but in five minutes cytosol had less capacity to N-acetylate this compound. Both 4-acetylamino-2-toluene and 2-acetylamino-4-aminotoluene then became substrates for N-acetyltransferases and were further N-acetylated to 2,4-diacetylaminotoluene.

0653 DERMAL CARCINOGENICITY STUDY BY MOUSE-SKIN PAINTING WITH 2,4-TOLUENEDIAMINE ALONE OR IN REPRESENTATIVE HAIR DYE FORMULATIONS. (Eng.) Giles, A. L., Jr. (Food and Drug Admin., Dept. Health, Education, and Welfare, Washington, DC); Chung, C. W.; Kommineni, C. *J Toxicol Environ Health* 1(3): 433-440; 1976.

The chronic toxicity of 2,4-toluenediamine (2,4-TDA) alone or in combination with a hair dye complex (2,5-toluenediamine, p-phenylenediamine, and resorcinol) was studied for 2 yr in Swiss-Webster mice of both sexes by a weekly skin-painting technique. Application of chemicals was stopped if marked irritation, ulceration, or tumor formation appeared, and resumed when the skin looked normal. The predominant neoplasms seen in these mice were primary pulmonary adenomas and adenocarcinomas. Skin neoplasms were seen in most groups of mice, including untreated control mice. Statistical analysis of the incidences of skin neoplasms among the groups of mice did not show any significant differences. The 2,4-TDA alone or mixed with the hair dye complex did not produce any abnormal proliferation and maturation of the squamous epithelium of the skin. The 2,4-TDA under these experimental conditions was nontoxic and noncarcinogenic to the skin of mice.

0654 EFFECT OF 7,8-BENZOFLAVONE ON THE FORMATION OF BENZO[a]PYRENE-DNA-BOUND PRODUCTS IN HAMSTER EMBRYO CELLS. (Eng.) Baird, W. M (Wistar Inst. Anatomy, 36th St. at Spruce, Philadelphia, PA 19104); Diamond, L. *Chem Biol Interact* 13(1): 67-75; 1976.

The hydrocarbon-deoxyribonucleoside products present in enzyme digests of DNA from hamster embryo cultures that had been treated with [^{3}H]-benzo[a]pyrene (BP) were isolated by chromatography on Sephadex LH20 columns. The products isolated from cells treated with 7,8-benzoflavone (7,8-BF) for 18 hr prior to the addition of [^{3}H]BP were indistinguishable from the products isolated from untreated cultures, but the amounts of these products decreased with increasing concentrations of 7,8-BF. The amount of BP metabolized was also decreased in 7,8-BF-treated cultures. The decrease in the amounts of hydrocarbon-deoxyribonucleoside products per mg DNA was logarithmic with respect to the decrease in BP metabolism. The findings are consistent with the hypothesis that 7,8-BF inhibits both an initial and a later metabolic step involved in the conversion of BP to a reactive species that binds to cellular DNA, as there was no direct relationship between metabolism and binding, and no observed accumulation of an intermediate metabolite.

0655 THE BINDING OF BENZO[A]PYRENE TO DNA DOES NOT INVOLVE SUBSTITUTION AT THE 6-POSITION. (Eng.) King, H. W. S. (Inst. Cancer Res., Nightingales Lane, Chalfont St. Giles, Buckinghamshire HP8 4SP, Great Britain); Thompson, M. H.; Osborne, M. R.; Harvey, R. G.; Brookes, P. *Chem Biol Interact* 12(3/4); 425-428; 1976.

The contribution made by metabolism at the 6-position of benzo[a]pyrene (BP) to the DNA binding occurring both in cells in culture and mediated by rat liver microsomes in vitro was assessed. Thin-layer chromatography, elution of individual products into methanol, and the determination of their tritium to ^{14}C ratio in comparison with that of the recovered unmetabolized [6-^{3}H][^{14}C]BP enabled the loss of tritium accompanying formation of each metabolite to be assessed. DNA isolated from mouse embryo cells exposed to [^{3}H][^{14}C]BP gave a single product that retained 95% of the tritium of the starting hydrocarbon. The two products resulting from DNA with [^{3}H][^{14}C]BP bound during microsomal metabolism in the presence of added native DNA also indicated negligible loss of tritium. The data indicate that the binding of BP to DNA, either in cells or as mediated by microsomes, does not involve substitution at the 6-position.

0656 COMPARISON OF THE METABOLISM OF BENZO[a]-PYRENE AND BINDING TO DNA CAUSED BY RAT LIVER NUCLEI AND MICROSOMES. (Eng.) Alexandrov, K. (Institut des Recherches Scientifiques sur le Cancer C.N.R.S., B.P.-8, 94 Villejuif, France); Brookes, P.; King, H. W. S.; Osborne, M. R.; Thompson, M. H. *Chem Biol Interact.* 12(3-4): 269-277; 1976.

The nuclear and microsomal metabolism of benzo(a)-pyrene (BP) in CB rat liver cells were compared. The metabolism of BP was also compared with that of 3-methylcholanthrene (3MC). Administration of 3MC (4 mg/day, two days, ip) to rats greatly enhanced the aryl hydrocarbon hydroxylase (AHH) activity of liver nuclei. However, the binding in vitro of 3-25 Ci/mM [^{3}H]BP to DNA within the nuclei which occurred at the same time as hydroxylation of BP was much less enhanced. Thin layer chromatography of the metabolites of BP produced by these nuclei revealed the same metabolites in similar relative amounts as were produced by rat liver microsomes prepared from rats that had received 3MC. The binding to DNA was further analyzed by hydrolysis of the DNA and fractionation on a Sephadex column. The binding to DNA in nuclei was very similar in nature to that which occurred when calf-thymus DNA was added to microsomes metabolizing BP. This observation taken together with the similarity observed between the microsomal and nuclear AHH seen in these studies and the probable location of this nuclear activity in the outer nuclear membrane (found in a previous study) make it unlikely that the activity is essential to the binding of BP to DNA.

0657 BINDING OF [^{3}H]BENZO(a)PYRENE TO DNA IN CULTURED HUMAN BRONCHUS. (Eng.) Harris, C. C. (Human Tissues Studies Section, Building 37, Room 3A07, Natl. Cancer Inst., Bethesda, MD); Frank, A. L.; Van Haaften, C.; Kaufman, D. G.; Connor, R.; Jackson, F.; Barrett, L. A.; McDowell, E. M.; Trump, B. F. *Cancer Res* 36(3): 1011-1018; 1976.

The factors affecting the binding of benzo(a)pyrene (BP) to macromolecules in cultured human bronchial mucosa were investigated. Bronchial specimens were obtained at either surgery or ''immediate'' autopsy from 11 patients with and without lung cancer. Grossly normal-appearing pieces of bronchus were cultured in a chemically defined medium, CMRL 1066 medium containing 1 μg insulin/ml, 0.1 μg β-retinyl acetate/ml, 0.1 μg hydrocortisone hemisuccinate/ml, 2 mM L-glutamine, 100 U penicillin G/ml, and 100 μg streptomycin/ml. After seven days, explant cultures were exposed to [^{3}H]BP, usually for 24 hr, and then binding to total cellular macromolecules was studied by autoradiography. Binding to DNA was measured following isolation of DNA from bronchial mucosal cells. The extent of binding of [^{3}H]BP was dependent on dose of BP, length of exposure to [^{3}H] BP, and temperature. Increasing levels of [^{3}H]BP bound to DNA were found with increasing doses of [^{3}H]BP, while the binding of [^{3}H]BP to macromolecules decreased from 36.5 C to 0 C. By autoradiography, bronchial epithelial cells bound more [^{3}H]BP than stromal fibroblasts. Both 7,8-benzoflavone and butylated hydroxytoluene reduced the level of [^{3}H]BP bound to DNA while nicotine apparently did not alter the level of binding. These studies demonstrate that the bronchial mucosa has the capacity to form metabolites of BP which bind to macromolecules including DNA. In addition, 7,8-benzoflavone and butylated hydroxytoluene, both known to alter the microsomal metabolism of BP, reduce the level of [^{3}H]BP bound to DNA.

0658 POLYCYCLIC AROMATIC HYDROCARBONS IN HUMAN BRONCHIAL CARCINOMA. (Eng.) Tomingas, R. (Medizinisches Institut fuer Lufthygiene und Silikoseforschung an der Universitaet Duesseldorf, Gurlittstrasse 53, D-4000 Duesseldorf, W. Germany); Pott, F.; Dehnen, W. *Cancer Lett* 1(4): 189-196; 1976.

Polycyclic aromatic hydrocarbons (PAH) were studied to determine whether and to what extent they were present in human bronchial carcinoma. Twenty-four carcinomas, from surgical operations and autopsies, were examined. The samples were tested for 12 PAH by direct fluorescence analysis on thin-layer plates. Only four of the 12 PAH were detected in the cancerous tissue: benzo(a)pyrene, fluoranthene, benzo(ghi)perylene and perylene. Increased concentrations of benzo(a)pyrene were found in all carcinomas, while only small amounts were found in noncancerous lung tissue.

0659 KINETIC STUDIES OF BENZPYRENE AND HYDROXYBENZENE METABOLISM. (Eng.) Robie, K. M. (Yale Univ. Sch. Medicine, New Haven, CT 06510); Cha, Y.-N.; Talcott, R. E.; Schenkmen, J. B. *Chem Biol Interact* 12(4): 285-297; 1976.

The kinetics of benzpyrene (BP) metabolism were examined in liver microsomes of male Sprague-Dawley rats. In accordance with previous results, the kinetics exhibited curvilinear Lineweaver-Burk plots. The problem was exacerbated in microsomes of 3-methylcholanthrene (MC-ms, 20 mg/kg for three days) treated rats. The Km for BP, measuring hydroxybenzpyrene (OHBP) appearance was about 0.3 μM in MC-treated adult rats and about 1.0 μM in untreated rats. These values were obtained using a substrate range of 0.2-2.0 μM benzpyrene, 20 μg of microsomal protein/ml and a three minute assay time. With longer assay times and with higher microsomal protein concentrations, curvilinear reciprocal plots were obtained. This was found to be due to a combination of three factors: nonspecific binding of BP to the microsomes, rapid depletion of substrate, and further metabolism of hydroxy products. At 100 μg microsomal protein/ml about 50% of added BP was nonspecifically bound to the microsomes in the range of 0.2-2.0 μM BP. Addition of albumin to the medium (1 mg/ml) greatly enhanced the BP hydroxylase activity but only slightly increased the amount of BP remaining in the medium after sedimentation of the microsomes by centrifugation. 3-OHBP, one of the phenolic products of BP metabolism, was found to be metabolized to a nonfluorescent product(s); the Km for this compound was similar to that for BP. Differences were seen in the Vmax rates of BP disappearance and OHBP appearance. Disappearance of BP was several-fold faster than OHBP appearance and had a larger Km. The latter may be due to the need to use higher amounts of protein and to allow depletion of enough substrate to make measurements significantly reproducible, or the higher Km may reflect a composite value for different routes of BP metabolism.

0660 EFFECT OF BENZO(A)PYRENE AND CHLORPROMAZINE ON ARYL HYDROCARBON HYDROXYLASE ACTIVITY FROM RAT TISSUES. (Eng.) Ciaccio, E. I. (Hahnemann Medical Coll. and Hosp., Phila. PA 19102); De Vera, H. *Biochem Pharmacol* 25(8): 985-987; 1976.

The distribution and relative levels of aryl hydrocarbon hydroxylase (AHH) in nine rat tissues were studied, as well as the induction response to 3,4-benzo(a)pyrene (BP) and chlorpromazine (CP). There was an endogenous AHH activity in the lymph nodes, prostate, salivary glands, and lactating mammary glands, as well as lung, kidney, liver, and spleen. Although levels in extrahepatic tissues were low compared to liver, induction with BP caused an increase equal to or greater than that for liver. Induction by CP was significant in the lung and kidney as well as the liver. The results indicate that AHH is an enzyme system that can be induced and measured in many rat tissues.

0661 BINDING OF POLYCYCLIC HYDROCARBONS TO NUCLEAR COMPONENTS IN VITRO. (Eng.) Vaught, J. (Medical Coll. Georgia, Augusta, GA 30902); Bresnick, E. *Biochem Biophys Res Commun* 69(3): 587-591; 1976.

Studies were undertaken to confirm the existence of nuclear aryl hydrocarbon hydroxylase and the increased binding of polycyclic hydrocarbons to nuclear components in vitro. Rat liver nuclei were incubated with microsomes, a NADPH-generating system, microsomes, and ^{3}H-benzo(a)pyrene. Binding of polycyclic hydrocarbons was noted to nuclear DNA, nuclear proteins and microsomal proteins. When nuclei or microsomes from 3-methylcholanthrene treated animals were used, binding to nuclear DNA and microsomal protein was increased. These data confirm the presence of a nuclear aryl hydrocarbon hydroxylase, extend previous studies on macromolecular acceptors to include nuclear proteins and demonstrate reduced binding to nuclear proteins and DNA when microsomes are included in the incubation system with nuclei.

0662 THE EFFECT OF CARCINOGENS ON MITOTIC FREQUENCY IN MOUSE LUNG PRIMORDIA IN VITRO. (Eng.) Masters, J. R. W. (Royal Infirmary, Edinburgh, EH3 9YW, Scotland). *Eur J Cancer* 12(3): 219-225; 1976.

The chronology and extent of alterations in epithelial and mesenchymal mitotic indices induced by 3-methylcholanthrene (MCA), 3,4-benzo(a)pyrene (BP), or urethan were studied using mouse embryonic lung in organ culture. MCA at 5.0 and 7.5 μg/ml and BP at 0.1, 0.2, and 0.5 μg/ml (48-72 hr) increased epithelial cell mitotic frequency but reduced mesenchymal cell mitotic frequency. These alterations were highly dependent upon time in culture. The alterations in the frequencies of epithelial and mesenchymal cell mitosis were similar in the presence of urethan. These results provide further evidence that the epithelium and mesenchyme exhibit a differential response to carcinogens, and it is suggested that the observed changes in mitotic frequency may have been the result of modification of epithelial-mesenchymal interactions controlling cell growth.

0663 EVALUATION OF BEESWAX-TRICAPRYLIN VEHICLE FOR PULMONARY CARCINOGENESIS STUDIES. (Eng.) Veal, J. T. (Pacific Northwest Lab., Richland, WA 99352); Dagle, G. E. *Toxicol Appl Pharmacol* 35(1): 157-164; 1976.

The release properties of three compounds (nicotine, 3-methylcholanthrene, and phenol), representative of three different subfractions of cigarette smoke condensate (CSC), were characterized from a beeswax-tricaprylin matrix. The release profiles for the three materials varied greatly, indicating that the beeswax-tricaprylin vehicle did not provide a uniform administration of whole CSC or multicomponent fractions of CSC to the implant site. The pellets produced a varying exposure of the CSC components to the tissue, based on the chemical nature of the individual component. The release of nicotine from the beeswax-tricaprylin vehicle was rapid and dependent on the geometry of the pellet and concentration. The in vitro release data for nicotine correlated well both with the single component in vivo data and with in vivo data where nicotine was part of whole CSC in the implant pellet. The release of 3-methylcholanthrene was slow and had approximately zero-order kinetics. The phenol release profile was between nicotine and 3-methylcholanthrene, which correlates with the relative polarity of the three materials. Modeling the release characteristics of a component of CSC by testing its individual release properties in vitro was found to be a promising method to establish the dose and dose rate of various components of CSC from implant vehicles, and to evaluate in vivo exposure data in terms of the exposure rate of the various components of CSC.

0664 STUDIES ON IN VITRO CARCINOGENESIS. I. AUTORADIOGRAPHIC AND BIOCHEMICAL STUDY ON THE INCORPORATION OF LABELLED METHYLCHOLANTRENE INTO MOUSE EMBRYONIC CELLS.

(Eng.) Kopper, L. (Semmelweis Medical Univ., 1085 Budapest VIII, Ulloi ut 26, Hungary); Jeney, A.; Ferencz, G.; Lapis, K.; Szende, B. *Z Krebsforsch Klin Onkol* 85(2): 117-124; 1976.

The incorporation of radio-labeled methylcholanthrene into CBA/T_6T_6 mouse embryonic fibroblast cultures was studied by using light and electron microscopic autoradiographic and liquid scintillation counting techniques. During 24 hr treatment with methylcholanthrene (0.01-2.5 µg/ml), the proportion of cells labeled with ^{3}H-methylcholanthrene and the number of grains in the cells were related to the duration of treatment and also to the doses. At 24 hr all cells treated with 2.5 µg/ml were labeled, whereas at 0.01 and at 0.1 µg/ml concentrations methylcholanthrene was detected in only 2 and 10% of the cell population, respectively. The results suggest that the labeling index reached saturation level earlier than the average number of grains. Electron microscopic autoradiography revealed an even distribution of grains, and there was no evidence for preferential binding site of methylcholanthrene. Biochemical separation showed that 59 and 44% of the radioactivity was bound to macromolecules at 1 and 24 hr respectively, after commencing treatment.

0665 CARCINOGENIC EFFECTS OF DIFFERENT NITROSO-COMPOUNDS IN CHINESE HAMSTERS: N-DIBUTYLNITROSAMINE AND N-NITROSOMETHYLUREA.

(Eng.) Reznik, G. (Abteilung fuer Experimentelle Pathologie, Medizinische Hochschule Hannover, 3000 Hannover 61, Karl-Wiechert Allee 9, W. Germany); Mohr, U.; Kmoch, N. *Cancer Lett* 1(4): 183-188; 1976.

Three hundred and twenty Chinese hamsters (*Cricetulus griseus*) were given sc 1/5, 1/10 or 1/20 the mean lethal dose (LD_{50}) of N-dibutylnitrosamine (DBN) or N-nitrosomethylurea (NMU). In several respects these two substances produced the same organotropy in the Chinese hamsters as in the Syrian golden and European hamsters. DBN produced lung tumors and neoplasms of the injection site. NMU induced tumors of the injection site only.

0666 ACTIVE SPECIFIC IMMUNOTHERAPY OF MOUSE METHYLCHOLANTHRENE INDUCED TUMOURS WITH *CORYNEBACTERIUM PARVUM* AND IRRADIATED TUMOUR CELLS.

(Eng.) Bomford, R. (Wellcome Res. Lab., Beckenham, Kent BR3 3BS, England). *Br J Cancer* 32: 551-557; 1975.

The use of *Corynebacterium parvum* and irradiated tumor cells for the immunotherapy of methylcholanthrene-induced fibrosarcomas of CBA mice was studied. For nonspecific immunotherapy, mice were challenged with tumor cells sc or iv, and 2 days later were injected iv with dilutions of *C. parvum*. The only significant effect was a retardation of sc tumor growth by the highest concentration of *C. parvum* (350 µg). However, active specific immunotherapy, using mixtures of *C. parvum* and irradiated or living tumor cells in the footpads, suppressed tumor growth when given at 2 or 6, but not 10, days after tumor challenge. Successful therapy required sufficient tumor cells (at least 5 x 10^4); an optimal dose of *C. parvum* (5-120 µg, increasing with the number of tumor cells); an intact T cell system; and the same tumor cells for challenge and treatment. The specificity was confirmed in a protection system in which treatment was given 7 days before tumor challenge. No protective immunity could be achieved with mixtures of *C. parvum* and fetal cells. Thus in this system *C. parvum* potentiates protective immunity only to the tumor unique tumor-specific transplantation antigen.

0667 CLINICAL EVALUATION OF TWO WEEKLY DOSE SCHEDULES OF 'IC-140'.

(Eng.) Elias, E. G. (Roswell Park Memorial Inst., 666 Elm St., Buffalo, NY 14203); Band, P. R.; Mittelman, A.; Colsky, J.; Regelson, W.; Shnider, B. I.; Hanley, J. A. *Oncology* 31(5-6): 273-279; 1975.

Fifty-three patients with intractable malignant diseases that were treated with a new alkylating agent, 4-N,N-bis (2-chloroethyl) amino phenyl N (P-carboxyphenyl) carbamate, also known as 'IC-140', were evaluated. The records of an additional 41 patients entered on this study could not be assessed from the standpoint of toxicity. At the dose level of 150 mg/m^2/week, severe leukopenia (< 2,000) and thrombocytopenia (< 75,000) were encountered in 23 of 34 patients. At the 100 mg/m^2/week dose level, the severe toxicity was reduced to 8 out of 19 patients. Tumor response was evaluated in 43 patients. The overall response was 23% (29% at the 150 mg/m^2, 13% at the 100 mg/m^2) and the duration of the response varied from 3-32 wk with a mean duration of 13 wk. Responses were noted in patients with ovarian, renal, lung, hepatic, breast carcinomas, and lymphosarcoma.

0668 EARLY MEMBRANE ALTERATIONS IN ISOLATED CELLS TREATED WITH CHEMICAL CARCINOGENS.

(Eng.) Peitras, R. J. (Dept. Biology, Univ. California, Los Angeles, CA 90024); Szego, C. M. *Cancer Lett* 1(4): 237-242; 1976.

Experiments were performed to obtain data on the earliest stage at which behavioral changes can be detected in normal cells following exposure to a mitogenic concentration of a carcinogen. Membrane alterations were detected in isolated epithelial cells (bullfrog urinary bladder and uterine tissue of ovariectomized rats) treated in vitro with 5 x 10^{-4} M dibutylnitrosamine (DBN) or 1.2 x 10^{-9} M diethylstilbestrol (DES) for 30 min. Addition of DBN to bladder cells and DES to endometrial cells elicited a striking increment in concanavalin A (Con A)-mediated hemadsorption, but not Con A binding, to the treated cells as compared to those not treated with carcinogens. Concomitantly, release of the lysosomal proteinase, cathepsin B_1, to the extracellular medium was essentially doubled in the preparations exposed to the carcinogens, as compared to corresponding controls. The increased cellular hemagglutination in response to carcinogen treatment was significantly reduced by prior incubation of the epithelial cells with ovomucoid, which suppresses the activity of cathepsin B_1.

0669 COMMENT ON THE MUTAGENIC EFFECTIVENESS OF VINYL CHLORIDE METABOLITES. (Eng.) Hussain, S. (Wallenberg Lab., Univ. Stockholm, S-104 05 Stockholm, Sweden); Osterman-Golkar, S. *Chem Biol Interact* 12(3/4): 265-267; 1976.

In the region of low doses on dose-response curves, the mutagenic effectiveness per unit dose, determined as the time integral of concentration, was found for several alkylating agents to be approximately proportional to the calculated rate of reaction at a certain low nucleophilic strength, n approximately equal to 2. This proportionality appears to be independent of the nature of the alkyl introduced, and for this reason the computed degree of alkylation at n equal to 2, and at a given tissue dose, may be used tentatively to estimate genetic risk. The mutagenic effectiveness of chloroethylene oxide was found to be higher than the values obtained for two standard compounds, ethylene oxide and methyl methanesulfonate.

0670 THE MUTAGENICITY OF CHLOROETHYLENE OXIDE, CHLOROACETALDEHYDE, 2-CHLOROETHANOL AND CHLOROACETIC ACID, CONCEIVABLE METABOLITES OF VINYL CHLORIDE. (Eng.) Rannug, U. (Wallenberg Lab., Univ. Stockholm, S-104 05 Stockholm, Sweden); Gothe, R.; Wachtmeister, C. A. *Chem Biol Interact* 12(3-4): 251-263; 1976.

The ability of four conceivable metabolites of vinyl chloride - chloroethylene oxide, chloroacetaldehyde, 2-chloroethanol and chloroacetic acid - to cause base-pair substitution directly in *Salmonella typhimurium* TA1535 was compared. The main comparison was performed at initial concentrations from 0.1-1.5 mM. In this region, however, a mutagenic effect was observed only with chloroethylene oxide and chloroacetaldehyde, the former being approximately 20 times more effective than the aldehyde when compared on a molar basis. 2-Chloroethanol and chloroacetic acid were also studied at higher concentration (1 mM-1 M), and a weak mutagenic response was found with a 1 M 2-chloroethanol solution. With chloroacetic acid no enhancement of the mutation frequency could be detected. Chloroethylene oxide was found to be approximately 450 times more effective as a mutagen than chloroacetaldehyde when the comparison was based on exposure doses, defined as the time-dependent concentrations of the compounds in the treatment solutions, integrated between the times of onset and termination of treatment. Similarly, chloroethylene oxide was 10,000-15,000 times more effective as a mutagen than ethylene oxide, used as a positive control. Although chloroethylene oxide might play a part in the previously reported mutagenicity of vinyl chloride, it is more likely that it is the active metabolite of major importance, as this substance has the most pronounced property of producing a high number of mutants at low doses without causing a toxic effect.

0671 ELECTRON SPIN RESONANCE SPIN-LABEL STUDIES OF INTERCALATION OF ETHIDIUM BROMIDE AND AROMATIC AMINE CARCINOGENS IN DNA. (Eng.) Hong, S.-J. (Gang-Won Natl. Univ., Chun-Chon, Korea); Piette, L. H. *Cancer Res* 36(3): 1159-1171; 1976.

A spin-labeled technique was developed for the study of carcinogen-DNA intercalation mechanisms utilizing a modified ethidium bromide as a model ligand and specifically synthesized spin labels of carcinogenic aromatic amines such as 2-aminofluorene, 2-aminoanthracene, and 6-aminochrysene. The technique takes advantage of the characteristic electron spin resonance anisotropy of the corresponding spin labels complexed with DNA. Analysis of the orientation-dependent information thus obtained clearly showed that the ligand moieties in all four respective complexes are accommodated in adjacent base-pair layers of the DNA with the nitroxide reporter oriented in one preferential direction. The geometry of the nitroxide rings was largely dependent upon the size of the ligand moiety and the position of the reporter attachment on the ligand molecule. Temperature studies in which the heat-induced release of the bound label was monitored by electron spin resonance gave an accurate measure of the complex dissociation characteristics that appear to parallel the helical coil cooperative melting transition monitored by absorbance measurements. The extent of dissociation of the bound spin labels parallels almost exactly the melting, i.e., unzipping of the DNA double helix, suggesting that the spin labels are immobilized by intercalation at the site on the DNA directly involved in the maintenance of the double helical structure. Analysis of the electron spin resonance spectra of the complexes in terms of the extent of immobilization indicated that, for aromatic amine spin labels, two different binding species exist, one strongly immobilized presumably at a guanine-cytosine base-pair region and the other partially immobilized in a region other than guanine-cytosine base pair. Competitive binding of the labels with respect to their parent ligand and binding isotherm results showed that nitroxide substitution did not affect the type of binding but did affect the extent of binding, i.e., binding constant with the labeled compound having a lower affinity.

0672 TUMORIGENICITY OF β-PHENYLETHYLHYDRAZINE SULFATE IN MICE. (Eng.) Toth, B. (Univ. Nebraska Medical Center, Omaha, Nebraska 68105). *Cancer Res* 36(3): 917-921; 1976.

The continuous lifetime administration of 0.015% β-phenylethylhydrazine sulfate in the drinking water of randomly bred albino Swiss mice, beginning at six weeks of age, gave rise to tumors of the lungs and blood vessels. As compared to untreated controls, the incidence of lung tumors rose from 21 to 56% in females and from 23 to 36% in males, while the incidence of vascular tumors increased from 5 to 44% in females and from 6 to 8 percent in males. Statistically, the increased incidence of tumors of lungs and blood vessels in females appears to be significant. The treatment had no statistically significant effect on the development of tumors in males. Histopathological examination revealed the characteristic appearance of adenoma and adenocarcinoma of the lungs, and angioma and angiosarcoma of blood vessels. This study reports for the first time the tumorigenicity of β-phenylethylhydrazine sulfate, which is currently used to treat mental depression.

0673 CARCINOGENIC EFFECT OF 1-BUTYL-1-NITROSOUREA ON FEMALE SPRAGUE-DAWLEY RATS.
(Eng.) Odashima, S. (Tokyo Biochemical Res. Inst., Takada 3-41-8, Toshima-ku, Tokyo 171, Japan); Hashimoto, Y.; Ogiu, T.; Maekawa, A. *Gann* 66(6): 615-621; 1975.

The carcinogenic effect of a single po administration of 300 or 200 mg/kg of 1-butyl-1-nitrosourea (BNU) and continuous po administration of 400 ppm solution of BNU in the drinking water for 5, 10, 15, and 20 wk was studied in female Sprague-Dawley rats. In addition, the number of spleen cells capable of forming plaques (PFC) against primary immunization with SRBC was investigated in various stages of the experiments. With a single po administration of BNU, tumors developed in 31/50 (62%) rats between the 25th and 75th wk. They were most frequently seen in the mammary gland (40%), followed by the stomach (10%), kidneys (8%), and ovary (8%). Leukemia was found in 8%. No dose-effect relationship was observed in these two experimental groups. In contrast, tumors developed in 67/77 (88%) of the rats that received BNU in their drinking water. The incidence of tumors was highest in leukemia (61%), followed by mammary tumors (26%), intestinal tumors (12%), and ear duct tumors (8%). There was a dose-effect relationship among the four groups in the latent period and target organs for tumor development. Although the PFC count of the rats receiving BNU for 5 wk recovered gradually to about 50% of the control level at the end of the 25th experimental week, it remained less than 10% of the control level for the whole experimental period in those receiving BNU longer than 10 wk. Therefore, it was apparent that the tumors developed, proliferated, and finally killed the host rats in a highly immunosuppressive state.

0674 TRANSPLACENTAL EFFECTS OF DIETHYLSTILBESTROL ON THE GENITAL TRACT OF HAMSTER OFFSPRING. (Eng.) Rustia, M. (Univ. Nebraska Medical Center, 42nd and Dewey Ave., Omaha, NB 68105); Shubik, P. *Cancer Lett* 1(3): 139-146; 1976.

The effect of diethylstilbestrol (DES) was investigated in Syrian golden hamster progeny exposed during the terminal stages of gestation (days 14 and 15). Eleven pregnant hamsters were treated with 40 or 20 mg/kg body weight of DES. This led to hyperplastic and neoplastic lesions in the reproductive system of most female progeny and was associated with continuous estrogenic stimulation. Seventy percent of the male progeny developed spermatic granulomas of the epididymis, and 40%, of the testis. The incidence and severity of these lesions were proportional to the dose of DES.

0675 STUDIES ON THE BIOLOGICAL DISPOSITION OF DIETHYLSTILBESTROL IN RATS AND HUMANS.
(Eng.) Fischer, L. J. (Dept. Pharmacology, Univ. Iowa, Iowa City, IA 52242); Weissinger, J. L.; Rickert, D. E.; Hintze, K. L. *J Toxicol Environ Health* 1(4): 587-605; 1976.

The results of previous and new studies concerning the circulation and excretion of diethylstilbestrol (DES) are presented. The previous studies showed that the apparent biological half-life of [^{14}C]DES decreases with increasing age in immature rats. The half-life of DES in adult rats (14 min) is reached between the 15th and 25th day after birth. Comparison of the intestinal absorption of [^{14}C]DES and [^{14}C]DES monoglucuronide has shown the unconjugated drug to be absorbed much more rapidly. Hydrolysis of the conjugate takes place in the lower intestine, and this permits the drug to undergo enterohepatic cycling. In the present investigation, placental transfer of [^{14}C]DES was studied in pregnant Sprague-Dawley rats at mid and late gestation. The drug and its metabolites were restricted in their movement from mother to fetus, and relatively low fetal levels were found. Only 0.0006% of the maternal dose of DES (0.2 mg/kg, iv) was found as the unchanged drug in each fetus at 90 min after drug administration. Conjugated metabolites were found in the fetus just prior to birth but not in the 13-day-old fetus. Analysis of plasma and urine after po administration of both [^{3}H]DES (0.26 mg) and [^{14}C]DES monoglucuronide (60 µg) to two human male subjects showed that the glucuronide was absorbed more slowly than DES. Similar metabolic products were found in the urine after administration of DES or its glucuronide conjugate. This and other indirect evidence indicate that the conjugate is hydrolyzed to DES in the gastrointestinal tract prior to absorption. The data show that the biological disposition of DES in humans is not greatly different from that observed in laboratory animals.

0676 MUTAGENICITY OF MALONALDEHYDE, A DECOMPOSITION PRODUCT OF PEROXIDIZED POLYUNSATURATED FATTY ACIDS. (Eng.) Mukai, F. H. (New York Univ. Medical Center, N.Y. 10016); Goldstein, B. D. *Science* 191(4229): 868-869; 1976.

A microbial mutagenesis assay system was used to investigate the mutagenicity of malonaldehyde, a lipid decomposition product. Twelve strains of *Salmonella typhimurium* were used: hisG46; TA1975; TA1535; hisC207; TA1976; TA1536; hisC3076; TA1977

A1537; hisD3052; TA1978; and TA1538. Mutagenic ctivity was determined by standard spot tests and uantitative soft agar techniques. Malonaldehyde as prepared from malonaldehyde bis-(dimethylaetal). The results showed that malonaldehyde is utagenically active, but only on frameshift muants with normal excision repair (hisD3052 is the ost sensitive). None of the base-pair substitution utants tested showed any increase in revertant requency. The pattern of mutagenic specificity as similar to that of Mitomycin C; both substances re DNA cross-linking agents. Malonaldehyde is specially prone to react with guanine and cytiine; the frameshift revertants of the hisD3052 utation seem to be expressed as a result of guaniine-cytidine base-pairs. The relationship between hese findings and human carcinogenesis or mutageneis associated with lipid peroxidation or the ngestion of a diet high in polyunsaturated fatty cids remains conjectural; the observation of hromosomal aberrations in the circulating lymphoytes of man and Chinese hamsters following inhalaion of low levels of ozone may be relevant because t is unlikely that ozone (which produces lung ipid peroxidation) can itself reach directly into he nucleus of circulating lymphocytes.

677 EVALUATION OF ASCORBYL MONOESTERS FOR THE INHIBITION OF NITROSOPYRROLIDINE ORMATION IN A MODEL SYSTEM. (Eng.) Pensabene, J. . (USDA Eastern Regional Research Center, ARS, hiladelphia, PA 19118); Fiddler, J.; Feinberg, .; Wasserman, A. E. *J Food Sci* 41(1): 199-200; 976.

he effect of a number of ascorbic acid derivatives n the nitrosation of pyrrolidine was determined n a model system developed to simulate the lipidqueous-protein composition of bacon. Sodium ascorate reduced nitrosopyrrolidine formation 43% in he aqueous phase, but had little effect in the ipid layer. The combination of several ascorbyl sters with sodium ascorbate increased the inhibiory effect to a high of 70% in the aqueous phase. here was a maximum of 49% reduction in nitrosation n the lipid phase.

)678 FLUORESCENT MODIFICATION OF GUANINE: REACTION WITH SUBSTITUTED MALONDIALDEHYDES. (Eng.) Moschel, R. C. (Sch. Chemical Sciences, Univ. Illinois, Urbana, IL 61801); Leonard, . J. *J Org Chem* 41(2): 294-300; 1976.

ix representative tricyclic 1,N^2-(allylidene)uanine derivatives or 10-oxo-9,10-dihydropyrimidol1,2-a]purines, which bear a variety of substituents at position 7 (the second carbon of the allylilene bridge), were prepared by reaction of the orresponsing malondialdehydes with guanine in queous 1 N HCl at 40 C. The substituted malondildehydes, by pKa determination, showed acidities imilar to those of substituted acetic acids and, y their ultraviolet absorption spectra, showed mphoteric behavior. The guanine products, strucural analogues of the naturally occurring Y bases, were compared in terms of their NMR, ultraviolet and fluorescence spectroscopic properties. The three ring protons of the tricyclic 1,N^2-(2-R-allylidene)guanine system showed proton magnetic resonance signals at low field in trifluoroacetic acid indicative of aromatic ring current. The ultraviolet spectra of the products exhibited long-wavelength absorption in aqueous acidic, neutral, and alkaline solution where guanine does not absorb, and their fluorescence spectra exhibited solvent dependence. In general, 1,N^2-[2-(p-methoxyphenyl)allylidene]guanine had the most favorable ultraviolet absorption and fluorescence emission properties, which suggests the potential utility of p-methoxyphenylmalondialdehyde in reactions with more complex guanine derivatives.

0679 MUTAGENIC ACTION OF ASCORBIC ACID. (Eng.) Stich, H. F. (Dept. Medical Genetics, Univ. British Columbia, Vancouver, Canada V6T 1WS); Karim, J.; Koropatnick, J.; Lo, L. *Nature* 260(5553): 722-724; 1976.

The possible mutagenic action of ascorbic acid was studied on cultured human fibroblasts. Cells treated with a mixture of ascorbic acid and Cu^{++} showed DNA fragmentation, DNA repair synthesis, and chromosome aberrations, while those treated with $CuSO_4$ showed no effects. Flushing of the ascorbic acid solution with N_2 immediately before application to the cells abolished the mutagenic effects. A significant frequency of *his*$^+$ revertants of the bacterium *Salmonella typhimurium* was induced by a 15 min exposure to the ascorbic acid-Cu^{++} mixture. A freshly prepared ascorbic acid solution exerted no mutagenic effect, nor did copper ions at a comparable concentration. The possible genetic hazard of ascorbic acid in man needs further evaluation.

0680 INHIBITION AND REVERSAL BY β-RETINOIC ACID OF HYPERPLASIA INDUCED IN CULTURED MOUSE PROSTATE TISSUE BY 3-METHYLCHOLANTHRENE OR N-METHYL-N'-NITRO-N-NITROSOGUANIDINE. (Eng.) Chopra, D. P. (Southern Res. Inst., Birmingham, AL 35205); Wilkoff, L. J. *J Natl Cancer Inst* 56(3); 583-589; 1976.

The effect of β-retinoic acid (RA) on carcinogen-induced hyperplasia was studied in organ cultures of mouse prostate gland. 3-Methylcholanthrene (MCA), requiring metabolic activation, or N-methyl-N'-nitro-N-nitrosoguanidine (MNNG), not requiring activation, was used to induce hyperplastic changes. Treatment of cultures with MCA or MNNG stimulated cell proliferation and caused the alveolar epithelium to become hyperplastic. The development of this hyperplasia was inhibited when RA was added simultaneously with MCA or MNNG. However, RA had no significant effect on cell proliferation in untreated control cultures. Elimination of carcinogen from the hyperplastic cultures after 8 days of treatment did not reverse hyperplasia of the alveolar epithelium. When the withdrawal of MCA or MNNG was followed by treatment of the cultures with RA, hyperplasia was markedly reversed within

96 hr. The results show that RA actively inhibited and reversed the effect of MCA and MNNG, two carcinogens that may have different mechanisms of action.

0681 INHIBITION OF PLASMIN-MEDIATED FIBRINOLYSIS BY VITAMIN E. (Eng.) Moroz, L. A. (Royal Victoria Hosp., Montreal, Quebec, Canada H3A 1A1); Gilmore, N. J. *Nature* 259(5540): 235-238; 1976.

The effect of vitamin E on the in vitro inhibition of plasmin-mediated fibrinolysis at physiological concentrations was studied. Fibrinolysis was assayed by a ^{125}I-fibrin tube method. Plasminogen was isolated from normal human plasma by affinity chromatography on lysine-Sepharose followed by elution with epsilon-aminocaproic acid. Vitamin E (D-alpha-tocopheryl succinate) was saponified to yield the free phenol. At 0.6×10^{-5} M, vitamin E produced 50% inhibition of fibrinolysis at a plasmin concentration of 5 µg ml^{-1} or 0.6×10^{-7} M, an inhibitor-enzyme ratio of 100:1. Other concentrations of vitamin E from 0.5×10^{-5} to 0.6×10^{-6} produced similar results. Sodium succinate or buffer had no effect. Neither heparin nor sodium dodecyl sulphate inhibited lysis of fibrin by plasmin (tested at 10^{-5}). Vitamin E produced similar results whether in the ester or phenol form. The inhibition of plasmin at physiological concentrations of vitamin E and enzyme suggests that this vitamin plays a role in the normal modulation of fibrinolysis; fibrinolysis is implicated in the development and spread of tumors.

0682 MODIFICATION OF RENAL TUMORIGENIC EFFECT OF STREPTOZOTOCIN BY NICOTINAMIDE: SPONTANEOUS REVERSIBILITY OF STREPTOZOTOCIN DIABETES (39209). (Eng.) Rakieten, N. (South Shore Analytical and Res. Lab., Inc., Islip, NY 11751); Gordon, B. S.; Beaty, A.; Cooney, D. A.; Schein, P. S. *Proc Soc Exp Biol Med* 151(2): 356-361; 1976.

Experiments were conducted to determine whether nicotinamide would protect rats against the renal carcinogenic action of streptozotocin and whether long-standing diabetes contributes to its oncogenic action. The renal oncogenic activity of streptozotocin in male Holtzman rats was significantly decreased by nicotinamide. Adenomas of the kidney were noted in 77% (21/28) of the animals treated with single iv dose of the streptozotocin (50 mg/kg), while only 18% (5/28) of animals given nicotinamide ip (350 mg/kg) 10 min before and 180 min after the same dose of streptozotocin had demonstrable renal tumors. Moreover, the renal adenomas induced by streptozotocin alone occurred sooner and were generally larger when compared with those in the animals treated with the nicotinamide-streptozotocin combination. The 50-mg/kg dose of streptozotocin was diabetogenic in all rats, but the diabetic state was not permanent. Spontaneous recovery from the diabetes was first noted after 8 and 10 mo of followup, and after 16 mo none of the surviving rats was diabetic.

0683 NON-NUTRITIVE SWEETENERS AND HUMAN BLADDER CANCER: PRELIMINARY FINDINGS. (Eng.) Kessler, I. I. (Johns Hopkins Univ. Sch. Hygiene Public Health, Baltimore, MD). *J Urol* 115: 143-146; 1976.

The intake of the nonnutritive sweeteners, saccharin and cyclamate, was assessed in 209 patients with bladder cancer and in 209 sex-, race-, and age-matched patients with diseases other than cancer as controls. The subjects were subjected to a personal interview with respect to their occupational history, smoking habits, and their use of artificial sweeteners (i.e., table sweeteners, diet beverages, diet foods, and total intake in all forms). The prior intake of such sweeteners in any and all forms was not greater or more prolonged among the cancer patients than in the controls. These findings were unaffected by case-control differences in diabetic histories or smoking practices. The results suggest that ingestion of nonnutritive sweeteners, at least at the moderate dietary levels reported by these patients, is not associated with an increased risk of bladder cancer.

0684 ASPIRIN INDUCED CHROMOSOME BREAKAGE IN *ALLIUM CEPA* L. (Eng.) Sen, P. (Cytogenetics Lab., Central Rice Res. Inst., Cuttack 753 006, Orissa, India); Naik, S.; Misra, R. N. *Curr Sci* 44(19): 713-714; 1975.

The frequency and types of chromosomal aberrations in actively growing root tips of *Allium cepa* were studied after treatment with aqueous solutions of acetyl salicylic acid (0.01, 0.02, 0.05, and 0.10%). The most immediate effect was the killing and arrest of further growth of cells. Few normal metaphases and anaphases could be found in the higher concentrations. The most conspicuous aberrations were the clumping of chromosomes, stickiness, and the erosion of chromatin masses. This indicated that the primary effect of aspirin might be the depolymerization of the nucleic acid in the chromosome. The occurrence of gaps, exchanges, and dots in low frequencies in the presence of acentric fragments and laggards at anaphase suggested several breaks might be occurring after aspirin treatments. Aspirin may thus be considered as a potential chromosome breaking agent in higher organisms.

0685 THE FATE OF FD&C RED NO. 2 AND ITS METABOLITE, NAPHTHIONIC ACID, AFTER DIFFERENT ROUTES OF ADMINISTRATION IN THE RAT. (Eng.) Pritchard, A. B. (General Foods Corporation Technical Center, Tarrytown, NY 10591); Holmes, P. A.; Kirschman, J. C. *Toxicol Appl Pharmacol* 35(1): 1-10; 1976.

Following a single oral dose of FD&C Red No. 2 to rats, the serum naphthionic acid concentrations remained constant for a period of six hours after reaching a maximum at approximately two hr postdosing. When naphthionic acid was administered po, the serum concentrations reached a peak two hr after dosing and thereafter decreased in an exponential fashion. Analysis of urine and feces showed that 63% of the po naphthionic acid dose was excreted in 72 hr, while 69% of the oral FD&C Red No. 2 dose was recovered as naphthionic acid in the 72-hr period. When three different doses of FD&C Red No. 2 were given po, the urinary naphthionic acid concentration showed a dose-response relationship. Repeated daily po doses of FD&C Red No. 2 or ingestion of the dye in drinking water resulted in a cyclic pattern of serum naphthionic acid concentrations, but there was was no evidence of naphthionic acid accumulation with time. In contrast to the fluctuating concentrations seen after repeated po doses or after drinking, consumption of FD&C Red No. 2 in the diet led to constant serum naphthionic acid concentrations that appeared to change very little with time.

0686 IDENTIFICATION OF MONOHYDROXY METABOLITES OF 15,16-DIHYDROCYCLOPENTA[a]PHENANTHREN-17-ONE AND ITS CARCINOGENIC 11-METHYL HOMOLOG PRODUCED BY RAT LIVER PREPARATIONS IN VITRO.

(Eng.) Coombs, M. M. (Imperial Cancer Res. Fund, Lincoln's Inn Fields, London WC2A 3PX, England); Hall, M.; Siddle, V. A.; Vose, C. W. *Arch Biochem Biophys* 172(2): 434-438; 1976.

The initial metabolic reactions of 15,16-dihydrocyclopenta[a]phenanthren-17-one and its carcinogenic 11-methyl homolog were investigated after in vitro incubation with rat liver microsomes in the presence of NADPH and oxygen. The monohydroxy metabolites, identified by UV spectrophotometry, gave similar patterns. The carcinogen was the more slowly metabolized compound, but both ketones gave the corresponding 15-hydroxy derivatives, together with small quantities of the isomeric 16-ols. The 11-hydroxymethyl-17-ketone also occurred as a minor metabolite. Incubation of the carcinogen with rat liver homogenates caused more extensive metabolism. The ratio of mono-ols to more polar metabolites was similar with homogenates from untreated and methylcholanthrene (0.1 mg, three times during the week before sacrifice)-induced rats, but increased metabolism to polar derivatives was observed after phenobarbitone (1% in drinking water, one week) induction.

0687 METABOLISM OF 2,5-DIPHENYLOXAZOLE (PPO) BY TROUT LIVER MICROSOMAL MIXED FUNCTION MONOOXYGENASE.

(Eng.) Ahokas, J. T. (Dept. Pharmacology, Univ. Oulu, SF-90220 Oulu 22, Finland). *Res Commun Chem Pathol Pharmacol* 13(3): 439-447; 1976.

The metabolism of 2,5-diphenyloxazole (PPO) was characterized in trout liver microsomes. Trout liver microsomes were found to metabolize PPO into at least one NaOH-extractable fluorescing metabolite having a strong excitation peak at 345 nm and an emission peak at about 510 nm. As the metabolite(s) was not characterized, Vmax was not determined; however, in arbitrarv fluorescent units (FU), Vmax is several-fold higher in the trout than in the male rat hepatic microsomes. Km is 12.7 M, about twice as high as reported for mouse. Optimum assay conditions were established for the metabolism of PPO by trout liver microsomes: NADPH generating system was essential, and the metabolism was strongly inhibited by α-naphthoflavone, but much less markedly by SKF 525 A or metyrapone.

0688 INDUCTION OF DT-DIAPHORASE BY 2,3,7,8-TETRACHLORODIBENZO-*p*-DIOTOXIN (TCDD).

(Eng.) Beatty, P. (Vanderbilt Univ. Sch. Medicine, Nashville, TN 37232); Neal, R. A. *Biochem Biophys Res Commun* 68(1): 197-204; 1976.

The ability of 2,3,7,8-tetrachlorodibenzo-*p*-dioxin (TCDD) to induce hepatic DT-diaphorase activity in male Sprague-Dawley rats was examined. Diaphorase activity was assayed by following the reduction of 2,6-dichlorophenol indophenol at 600 nm. A single ip injection of 90 μg/kg of TCDD resulted in a rapid rise in diaphorase activity in both cytosol and microsomes to a level approximately six-fold above olive oil-treated controls after 24 hr. Maximal induction of microsomal NADPH diaphorase was achieved in 24-48 hr, while approximately seven days were required for maximal induction in the cytosol. This maximal level in both cytosol and microsomes was maintained for at least 15 days postinjection. At lower doses of TCDD the onset of induction was less rapid. However, maximal induction was obtained at about seven days with all doses examined (5.63, 11.25, 22.5, and 45 μg/kg). There was a roughly linear relationship between NADH diaphorase and NADPH diaphorase activity at seven days and the dose of TCDD administered (linear regression correlation coefficient of 0.895 and 0.725, respectively). The authors conclude that TCDD is approximately 17,000 times more potent as an inducer of diaphorase activity than 3-methylcholanthrene.

0689 INDUCTION OF MITOTIC GENE CONVERSION IN *SACCHAROMYCES CERVISIAE* WITH CHLORDIAZEPOXIDE AND ITS N-NITROSO DERIVATIVE IN A HOST-MEDIATED ASSAY.

(Eng.) Krafft, S. (Zentralinstitut fuer Biochemie und Biophysic der Freien Universitaet Berlin, 1 Berlin 45 Limonenstr. 7, W. Germany); Onken, A. *Mutat Res* 34(2): 333-335; 1976.

The mutagenicity of N-nitrosochlordiazepoxide and of its precursor chlordiazepoxide was tested using a blood-mediated assay system. The genetic marker used was conversion at the trp5 locus. Wistar and Sprague-Dawley rats were injected in the tail vein with 4 x 10^9 cells of the indicator organism, *Saccharomyces cerevisiae*, in isotonic saline. Immediately thereafter, one of the test substances was given by sc injection into the back. One hour later, the animals were killed and their livers withdrawn. After the livers were homogenized, the yeast cells were sedimented at about 900 g and resuspended up to a titer of 5 x 10^7 cells/ml. A pronounced effect was observed with N-nitrosochlordiazepoxide with an optimum at 0.05 mmol/kg. This concentration reduced viability to about 70%. A weak but definite effect on mitotic gene conversion was also seen with chlordiazepoxide having an optimum at 0.1 mmol/kg, which has a slighter inactivating effect. Neither effect was observed in vitro.

0690 EPOXIDE TO OLEFIN: A NOVEL BIOTRANSFORMATION IN THE RUMEN. (Eng.) Ivie, G. W. (Veterinary Toxicology and Entomology Res. Lab., Agricultural Res. Service, US Dept. Agriculture, College Station, TX 77840). *Science* 191(4230): 959-961; 1976.

Enzymatic detoxication reactions were investigated. It was found that 1-(4'-ethylphenoxy)-3,7-dimethyl-6,7-epoxy-trans-2-octene (1) was metabolized to its 2,6-diene (2) analog in steers, probably in the digestive tract. Subsequent results confirmed that the 2,6-diene analog was generated within the alimentary canal. Fluids from the rumen, abomasum, and small intestine of sheep were filtered and incubated with labeled 1 at 1×10^{-5} M. After 3 hr at 39 C, the samples were extracted and analyzed on thin-layer chromatography. In the rumen samples, 36% of the starting epoxide 1 was converted to the diene 2, but this did not occur in the other fluids tested. When 1 was incubated with boiled rumen fluid, there was no conversion, indicating that the reaction was enzymatic. Studies demonstrated only that conversions of epoxide to olefin occur in the rumen, but such reactions may also occur in the digestive tract of other mammals. Such conversion may represent a significant metabolic pathway in mammals for potentially toxic epoxides.

0691 HEPATOCELLULAR CARCINOMAS IN ACATALASEMIC MICE TREATED WITH NAFENOPIN, A HYPOLIPIDEMIC PEROXISOME PROLIFERATOR. (Eng.) Reddy, J. K. (Univ. Kansas Medical Center, Kansas City, KS 66103); Rao, M. S.; Moody, D. E. *Cancer Res* 36(4): 1211-1217; 1976.

The effects of long-term administration of nafenopin, (2-methyl-2-(p-(1,2,3,4-tetrahydro-1-naphthyl)-phenoxy)propionic acid), a potent hypolipidemic drug with marked hepatomegalic and peroxisome-proliferative properties, were studied in wild-type (Cs(a)-strain) and acatalasemic (Cs(b)-strain) mice. Nafenopin was administered in the diet at a concentration of 0.1% during the first 12 mo and then at 0.05% until the termination of the experiment at 20 mo. By 56 wk, 100% mortality occurred in both male and female wild-type mice, whereas the mortality rate in acatalasemic mice was approximately 50%. At 18-20 mo, 9 of 9 male and 12 of 12 female acatalasemic mice that survived chronic nafenopin treatment developed hepatocellular carcinomas, some of which metastasized to the lungs. Numerous peroxisomes were seen in these lung metastases on electron microscopic examination; in contrast, the number of peroxisomes in primary liver tumor cells varied considerably. The hepatocarcinogenicity of nafenopin suggests the need for long-term studies with other hypolipidemic drugs that cause hepatomegaly and peroxisome proliferation, to clarify the role, if any, of peroxisome proliferation in liver carcinogenesis.

0692 RESOLUTION OF AFLATOXINS B_1, B_2, G_1, AND G_2 BY HIGH-PRESSURE LIQUID CHROMATOGRAPHY. (Eng.) Pons, W. A., Jr. (Agricultural Res. Service, U. S. Dept. of Agriculture, PO Box 19687, New Orleans, LA 70179). *Assoc Off Anal Chem* 59(1): 101-105; 1976.

0693 SCREENING METHOD FOR THE DETECTION OF AFLATOXIN, OCHRATOXIN, ZEARALENONE, PENICILLIC ACID, AND CITRININ. (Eng.) Wilson, D. M. (Dept. Plant Pathology, Univ. Georgia Experiment Stations, Coastal Plain Station, Tifton, GA 31794); Tabor, W. H.; Trucksess, M. W. *J Assoc Off Anal Chem* 59(1): 125-127; 1976.

0694 SURVEY FOR AFLATOXINS AND ZEARALENONE IN 1973 CROP CORN STORED ON FARMS AND IN COUNTRY ELEVATORS. (Eng.) Stoloff, L. (Food and Drug Admin., Washington, DC 20204); Henry, S.; Francis, O. J., Jr. *J Assoc Off Anal Chem* 59(1): 118-121; 1976.

0695 SIMPLE METHOD FOR SIMULTANEOUS DETECTION OF AFLATOXIN AND ZEARALENONE IN CORN. (Eng.) Seitz, L. M. (U.S. Dept. of Agriculture, 1515 College Ave., Manhattan, KS 66502); Mohr, H. E. *J Assoc Off Anal Chem* 59(1): 106-109; 1976.

0696 COLLABORATIVE STUDY OF A SCREENING METHOD FOR THE DETECTION OF AFLATOXINS IN MIXED FEEDS, OTHER AGRICULTURAL PRODUCTS, AND FOODS. (Eng.) Romer, T. R. (Ralson Purina Co., Checkerboard Square, St. Louis, MO 63188); Campbell, A. D. *J Assoc Off Anal Chem* 59(1): 110-117; 1976.

0697 *ASPERGILLUS FLAVUS* INFECTION AND AFLATOXIN IN MIXTURES OF HIGH-MOISTURE AND DRY MAIZE. (Eng.) Lillehoj, E. B. (Agricultural Research Service, U.S. Dept. Agriculture, Peoria, IL 61604); Fennell, D. I.; Hesseltine, C. W. *J Stored Prod Res* 12(1): 11-18; 1976.

0698 RADIOACTIVITY IN URINE AND FECES OF MINK (*MUSTELA VISON*) TREATED WITH [^{14}C] AFLATOXIN B_1. (Eng.) Chou, C.-C. (Dept. Food Science and Food Res. Inst., Univ. Wisonsin-Madison, Madison, WI 53706); Marth, E. H. *Arch Toxicol (Berl)* 35(2): 75-81; 1976.

0699 PARTICULATE CYTOCHROME *c* IN *AGROBACTERIUM TUMEFACIENS*. (Eng.) Van den Branden, C. (Laboratorium voor Microbiologie en Microbiele Genetica, Rijksuniversiteit Gent 35, K. L. Ledeganckstraat, B-9000 Gent, Belgium); Van Beeumen, J.; De Ley, J. *Arch Int Physiol Biochim* 83(5): 871-877; 1975.

700 OCTOPINE AS A MARKER FOR THE INDUCTION OF TUMOROUS GROWTH BY AGROBACTERIUM UMEFACIENS STRAIN B_6. (Eng.) Kemp, J. D. (Dept. lant Pathology, Univ. Wisconsin, Madison, WI 3706). *Biochem Biophys Res Commun* 69(3): 816-822; 976.

701 MYCOTOXINS IN FOODSTUFFS. VII. INACTIVATION OF PATULIN IN WHOLE WHEAT BREAD BY ULFHYDRYL COMPOUNDS. (Eng.) Reiss, J. (Mikrobiol-gisches Laboratorium, Grahamhaus Studt K. G., 655 ad Kreuznach, W. Germany). *Cereal Chem* 53(2): 150-52; 1976.

702 INSTABILITY OF PATULIN IN CHEDDAR CHEESE. (Eng.) Stott, W. T. (Dept. Food Science nd Technology, Univ. Nebraska, Lincoln, NE 68583); ullerman, L. B. *J Food Sci* 41(1): 201-203; 1976.

703 ALTERATIONS IN COENZYME A-SYNTHESIZING PROTEIN COMPLEX ACTIVITY RELATED TO YCLIC HYDROCARBON CONJUGATION (Proceedings Ab-tract). (Eng.) Morrison, J. C. (Univ. Tennessee enter Health Sciences, Memphis, TN 38163); Mor-ison, W. C.; Whybrew, W. D.; Wiser, W. L.; Buco-az, E. T. *IRCS Med Sci (Suppl)* 3(10): 23; 1975.

704 HIGH MUTAGENICITY AND TOXICITY OF A DIOL EPOXIDE DERIVED FROM BENZO[A]PYRENE. Eng.) Wislocki, P. G. (Dept. Biochemistry and rug Metabolism, Hoffman-LaRoche Inc., Nutley, NJ 7110); Wood, A. W.; Chang, R. L.; Levin, W.; Yagi, .; Hernandez, O.; Jerina, D. M.; Conney, A. H. *iochem Biophys Res Commun* 68(3): 1006-1012; 1976.

705 SPECIFIC POSITIONS INVOLVED IN ENZYME CATALYZED COVALENT BINDING OF BENZO[a]-YRENE TO POLY(G). (Eng.) Meehan, T. (Lawrence erkeley Lab., Univ. California, Berkeley, CA 4720); Warshawsky, D.; Calvin, M. *Proc Natl Acad ci USA* 73(4): 1117-1120; 1976.

706 SYNTHESIS AND SPECTRAL PROPERTIES OF THE ISOMERIC HYDROXYBENZO[a]PYRENES. (Eng.) Yagi, H. (Natl. Insts. Health, Bethesda, MD 20014); Holder, G. M.; Dansette, P. M.; Hernandez, O.; Yeh, H. J. C.; LeMahieu, R. A.; Jerina, D. M. *J Org Chem* 41(6): 977-985; 1976.

707 BILIARY EXCRETION OF 3,4-BENZPYRENE IN NAFENOPIN-TREATED RATS. (Eng.) Levine, . G. (Albert Einstein Coll. Medicine, Bronx, NY 10461); Bognacki, J. *J Pharmacol Exp Ther* 196(2): 286-492; 1976.

708 EFFECTS OF DIFFERENT DUSTS ON RESPIRATORY CARCINOGENESIS IN HAMSTERS INDUCED BY BENZO(A)PYRENE AND DIETHYLNITROSAMINE. (Eng.) Sellakumar, A. (Dept. Environmental Medicine, New York Univ., Tuxedo, NY 10987); Stenback, F.; Rowland, J. *Eur J Cancer* 12(4): 313-319; 1976.

0709 ACTIVATION OF 3':5'-CYCLIC AMP-DEPENDENT PROTEIN KINASE AND INDUCTION OF ORNITHINE DECARBOXYLASE AS EARLY EVENTS IN INDUCTION OF MIXED-FUNCTION OXYGENASES. (Eng.) Byus, C. V. (Univ. Arizona Medical Center, Tucson, AZ 85724); Costa, M.; Sipes, I. G.; Brodie, B. B.; Russell, D. H. *Proc Natl Acad Sci USA* 73(4): 1241-1245; 1976.

0710 STUDIES OF THE MORPHOLOGY AND TUMORIGENICITY OF EXPERIMENTAL BRAIN TUMOURS IN TISSUE CULTURE. (Eng.) Lantos, P. L. (Middlesex Hosp. Medical Sch., London, W.1, England); Roscoe, J. P.; Skidmore, C. J. *Br J Exp Pathol* 57(1): 95-104; 1976.

0711 BRIEF COMMUNICATION: INDUCTION OF MALIGNANT BONE TUMORS IN RATS BY 1-(2-HYDROXYETHYL)-1-NITROSOUREA. (Eng.) Pelfrene, A. (No Affiliation Given); Mirvish, S. S.; Gold, B. *J Natl Cancer Inst* 56(2): 445-446; 1976.

0712 THE KINETICS OF THE ALKALINE HYDROLYSIS OF PHOSPHOTRIESTERS IN DNA. (Eng.) Shooter, K. V. (Inst. Cancer Res., Royal Cancer Hosp., Fulham Road, London SW3 6JB, Great Britain). *Chem Biol Interact* 13(2): 151-163; 1976.

0713 A NONRADIOACTIVE METHOD FOR MEASURING DNA DAMAGE AND ITS REPAIR IN NONPROLIFERATING TISSUES. (Eng.) Zubroff, J. (Temple Univ. Sch. Medicine, Philadelphia, PA 19140); Sarma, D. S. R. *Anal Biochem* 70(2): 387-396; 1976.

0714 RELATIONSHIP BETWEEN ANTIGENICITY AND MORPHOLOGY OF MURINE LUNG ADENOMATA. (Eng.) Menard, S. (Istituto Nazionale per lo Studio e la Curo dei Tumori, Via G. Venesian 1, 20133 Milan, Italy); Colnaghi, M. I.; Boiocchi, M. *Br J Cancer* 33(3): 290-298; 1976.

0715 CELL KINETICS OF URETHANE-INDUCED MURINE PULMONARY ADENOMATA: II; THE GROWTH FRACTION AND CELL LOSS FACTOR. (Eng.) Dyson, P. (Dept. Pathology, Univ. Newcastle upon Tyne, England); Heppleston, A. G. *Br J Cancer* 33(1): 105-111; 1976.

0716 EFFECTS OF N-ACETOXY-2-ACETYLAMINOFLUORENE (AAAF) AND N-METHYL-N'-NITROSOGUANIDINE (MNNG) ON NUCLEAR DNA POLYMERASE FROM RAT LIVER (Proceedings Abstract). (Eng.) Guzzo, G. J. (Emory Univ. Medical Sch., Atlanta, GA 30322); Glazer, R. I. *IRCS Med Sci (Suppl)* 3(10): 21; 1975.

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0718 EFFECTS OF PHENOBARBITAL AND 3-METHYLCHOLANTHRENE ADMINISTRATION ON GLUTATHIONE-*S*-EPOXIDE TRANSFERASE ACTIVITY IN RAT LIVER. (Eng.) Mukhtar, H. (Medical Coll. Georgia, Augusta, GA 30902); Bresnick, E. *Biochem. Pharmacol.* 25(9): 1081-1084; 1976.

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0720 TRANSPLANTABLE SARCOMAS INDUCED BY 3-METHYLCHOLANTHRENE IN INBRED GUINEA PIGS OF JY-1 AND HARTLEY/F STRAINS. (Eng.) Kataoka, T. (Natl. Inst. Health, Kamiosaki 2-10-35, Shinagawa-ku, Tokyo 141, Japan); Tokunaga, T. *Gann* 67(1): 25-31; 1976.

0721 EFFECT OF FUNDIC ULCERS INDUCED BY IODOACETAMIDE ON DEVELOPMENT OF GASTRIC TUMORS IN RATS TREATED WITH N-METHYL-N'-NITRO-N-NITROSOGUANIDINE. (Eng.) Takahashi, M. (Nagoya City Univ. Medical Sch., 1 Kawasumi, Mizuho-cho, Mizuho-ku, Nagoya 467, Japan); Shirai, T.; Fukushima, S.; Hahanouchi, M.; Hirose, M.; Ito, N. *Gann* 67(1): 47-54; 1976.

0722 LARGE BOWEL CARCINOMA IN STRAIN-2 GUINEA PIGS BY INTRARECTAL INSTILLATION OF N-METHYL-N'-NITRO-N-NITROSOGUANIDINE. (Eng.) Narisawa, T. (Akita Univ. Sch. Medicine, 6-10 Senshu-Kubotacho, Akita 010, Japan); Wong, C.-Q.; Weisburger, J. H. *Gann* 67(1): 41-46; 1976.

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0727 BRIEF COMMUNICATION: TUMOR-PROMOTING ACTIVITY OF CIGARETTE TAR IN RAT SKIN EXPOSED TO IRRADIATION. (Eng.) McGregor, J. F. (Biology and Health Physics Div., Atomic Energy of Canada Ltd., Chalk River, Ontario, Canada). *J Natl Cancer Inst* 56(2): 429-430; 1976.

0728 FURTHER STUDIES ON THE REGULATION OF CULTURED RABBIT ENDOMETRIAL CELLS BY DIETHYLSTILBESTROL AND PROGESTERONE. (Eng.) Gerschenson, L. E. (Univ. California Los Angeles Sch. Medicine, 900 Veterans Ave., Los Angeles, CA 90272); Berliner, J. A. *J Steroid Biochem* 7(3): 159-165; 1976.

0729 HUMAN PROSTATIC EPITHELIAL CELLS IN CULTURE: CLONAL SELECTION AND ANDROGEN DEPENDENCE OF CELL LINE EB 33. (Eng.) Okada, K. (Urologische Universitatsklinik, Faculty of Medicine, Wuerzburg, W. Germany); Laudenbach, I.; Schroeder, F. H. *J Urol* 115: 164-167; 1976.

0730 DIMETHYLSULFOXIDE-INDUCED DIFFERENTIATION AND HEMOGLOBIN SYNTHESIS IN TISSUE CULTURES OF RAT ERYTHROLEUKEMIA CELLS TRANSFORMED BY 7,12-DIMETHYLBENZ(*a*)ANTRHACENE. (Eng.) Kluge, N. (Max-Planck-Institut fuer Experimentelle Medizin, D-3400 Goettingen, Hermann-Rein-Str. 3, W. Germany); Ostertag, W.; Sugiyama, T.; Arndt-Jovin, D.; Steinheider, G.; Furusawa, M.; Dube, S. K. *Proc Natl Acad Sci USA* 73(4): 1237-1240; 1976.

0731 DOSE-RESPONSE STUDY OF THE CARCINOGENICITY OF DIETARY SODIUM NITRITE AND MORPHOLINE IN RATS AND HAMSTERS. (Eng.) Shank, R. C. (Dept. Nutrition and Food Science, Massachusetts Inst. Technology, Cambridge, MA 02139); Newberne, P. M. *Food Cosmet Toxicol* 14(1): 1-8; 1976.

0732 CYTOTOXIC AND CARCINOGENIC RESPONSE TO MONOCROTALINE PYRROLE. (Eng.) Hooson, J. (Pathology Dept., B.I.B.R.A., Woodmansterne Rd., Carshalton, Surrey, England); Grasso, P. *J Pathol* 118(2): 121-128; 1976.

0733 AN ULTRASTRUCTURAL-CYTOCHEMICAL STUDY ON THE PROLIFERATION OF SMOOTH ENDOPLASMIC RETICULUM INDUCED BY CHLOROBIPHENYLS (PCB) IN THE GUINEA PIG LIVER CELLS. (Eng.) Amagase, H. (Faculty of Medicine, Kyushu Univ., 3-1-1 Maedashi, Higashi-ku, Fukuoka 812, Japan). *Arch Histol Jpn* 38(4): 285-298; 1975.

0734 CASE REPORT: MYELOMONOCYTIC LEUKAEMIA FOLLOWING CYCLOPHOSPHAMIDE THERAPY OF RHEUMATOID DISEASE. (Eng.) Love, R. R. (214 Heathcote Road, Hendersonville, NC 28739); Sowa, J. M. *Ann Rheum Dis* 34(6): 534-535; 1975.

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EXYLAMINE BY GAS CHROMATOGRAPHY. (Eng.) Matsumura,
. (Boehringer Ingelheim GmbH, Pharma Res. Japan,
03, Takada, Yato, Kawanishi, Hyogo-ken, 666-01,
apan); Kohei, H. *J Chromatogr* 117(2): 383-391;
976.

736 INVESTIGATIONS ON ESOPHAGEAL CARCINOGENICITY BY METHYLPHENYL-NITROSAMINE AND
THYL ALCOHOL IN RATS. (Eng.) Schmaehl, D. (Insti-
ut fuer Toxikologie und Chemotherapie am Deutschen
rebsforschungszentrum Im Neuenheimer Feld 280,
eidelberg, W. Germany). *Cancer Lett* 1(4): 215-
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URANS. (Eng.) Biaglow, J. E. (Dept. Radiology,
ase Western Reserve Univ., Cleveland, OH 44106);
ygaard, O. F.; Greenstock, C. L. *Biochem Pharmacol*
5(4): 393-398; 1976.

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NE DIOXIDE, BY HEPATIC MICROSOMES. (Eng.) Watabe,
. (Tokyo Coll. Pharmacy, Ueno-sakuragi, Taito-ku,
okyo 110, Japan); Sawahata, T. *Biochem Pharmacol*
5(5): 601-602; 1976.

739 THE ULTRASTRUCTURAL LOCALISATION OF CADMIUM. (Eng.) Popham, J. D. (Dept.
natomy, Univ. Sydney, Sydney, N.S.W. 2002, Aus-
ralia); Webster, W. S. *Histochemistry* 46(3): 249-
59; 1976.

740 CHEMICAL ACTIVATION OF NITROSAMINES INTO MUTAGENIC AGENTS. (Eng.) Baldwin, J. E.
Massachusetts Inst. Technology, Cambridge, MA
2139); Branz, S. E.; Gomez, R. F.; Kraft, P. L.;
inskey, A. J.; Tannenbaum, S. R. *Tetrahedron Lett*
5): 333-336; 1976.

0741 STRUCTURE-ACTIVITY RELATIONSHIPS IN NITROSAMINE CARCINOGENESIS. (Eng.) Wishnok, J. S. (Dept. Nutrition and Food Science, Massachusetts Inst. Technology, Cambridge, MA 02139); Archer, M. C. *Br J Cancer* 33(3): 307-311; 1976.

0742 DNA DAMAGE AND REPAIR IN VARIOUS ORGANS OF THE RAT INDUCED BY ALKYLATING CARCINOGENS (Proceedings Abstract). (Eng.) Cox, R. (Dept. Biochemistry, Univ. Tennessee, Memphis, TN 38104). *IRCS Med Sci (Suppl)* 3(10): 20; 1975.

0743 USE OF A TRANSPLACENTAL HOST-MEDIATED CULTURE SYSTEM FOR ASSAY OF TRANSFORMATION BY NITROSO COMPOUNDS (Proceedings Abstract). (Eng.) Quarles, J. M. (Carcinogenesis Program, Oak Ridge Natl. Lab., Oak Ridge, TN 37830); Schenley, C. K.; Tennant, R. W. *IRCS Med Sci (Suppl)* 3(10): 22; 1975.

See also:

* (Rev): 0601, 0602, 0603, 0604, 0605, 0606, 0607, 0608, 0621, 0622, 0624
* (Phys): 0748
* (Viral): 0777, 0842, 0868, 0880
* (Immun): 0884, 0892, 0894, 0927, 0938, 0940, 0943, 0945, 0948, 0949, 0950, 0951, 0961, 0967
* (Path): 1012, 1013, 1034, 1036, 1060, 1085
* (Epid-Biom): 1099, 1100, 1101, 1102, 1103, 1104, 1106, 1108, 1110, 1111, 1113, 1114, 1117

0744 THE INHIBITING EFFECT OF CAFFEINE ON THE INDUCTION OF SKIN CANCER IN THE MOUSE BY ULTRAVIOLET RADIATION. (Eng.) Zajdela, F. (Institut du Radium, Biologie, 91400-Orsay, France); Latarjet, R. *An Acad Bras Cienc* 45(Suppl. 1973): 211-213; 1973.

Female Swiss (Carshalton) strain mice were exposed to the radiation of a medium-pressure mercury vapor lamp. The lamp was placed 1 m from the animals, and 5 irradiations/wk (total, 133 irradiations/27 wk) were given in doses of 7.3 x 10^4 ergs mm^{-2}. During the experiment, the right ears were painted with a solution of caffeine before each irradiation, the left ears being the controls and painted with solvent only. Caffeine was chosen for its ability to inhibit the repair of UV-induced lesions in nucleic acid. After a period of inflammatory and congestive processes, the first tumors appeared at 5 mo and the last at 11 mo after initiation of radiation. The incidence of cancer was approximately 90% on the left ears and only 50% on the right ears. This result favors the hypothesis that cancer results from a misrepair of primary UV-induced lesions in the nucleic acid.

0745 DNA REPAIR AND UV RESISTANCE IN HUMAN MELANOMA. (Eng.) Lavin, M.; Chalmers, A. H.; Kidson, C. In: *Molecular Mechanisms for Repair of DNA.* Edited by P. C. Hanawalt; R. B. Setlow. (New York: Plenum Press): 817-819; 1975.

The special features of human melanoma were characterized in light of the observation that all tested melanoma cell lines showed marked resistance to 254-nm light, as judged by cloning efficiency in agar. Cloning efficiency was independent of differing melanin content. Dimer excision occurred at approximately the same rate, or slower, than for other human cells tested (more than 50% remained after 24 hr). Resistance to UV light is therefore not due to protection against dimer formation or to rapid dimer removal. [^{3}H]thymidine incorporation into DNA of melanoma cells after 250 ergs/mm^2 showed no fall in the number of heavily labeled nuclei as compared to unirradiated controls; however, in other human cells (HeLa, fibroblasts) there were few or no heavily labeled nuclei, even at lower doses. It is suggested that replication in melanoma cells is not inhibited at UV levels at which it almost completely stops in other cells. The net rate of [^{3}H]thymidine incorporation into DNA in irradiated melanoma cells was slower than into unirradiated cells. Human melanoma cells seem to owe their high UV resistance at least partly to a highly efficient postreplication repair system. It is not possible to exclude some direct overriding of dimers on the template during replication. Excision-repair appears less important. Replication is slower than in controls, and many replicons are started before early ones are completely joined. It is suggested that a high mutation rate after UV exposure may be related to the high malignancy of melanoma.

0746 CELL DIVISION REQUIREMENT FOR ACTIVATION OF MURINE LEUKEMIA VIRUS IN CELL CULTURE BY IRRADIATION. (Eng.) Otten, J. A. (Oak Ridge Natl. Lab., Oak Ridge, TN 37830); Quarles, J. M.; Tennant, R. W. *Virology* 70(1): 80-87; 1976.

Actively dividing cultures of AKR mouse cells were exposed to relatively low dose-rates of gamma radiation and tested for activation of endogenous leukemia viruses. Efficient and reproducible induction of virus was obtained with actively dividing cells, but cultures deprived of serum to inhibit cell division before and during gamma irradiation were not activated, even when medium with serum was added immediately after irradiation. These results indicate that cell division was required for virus induction but that a stable intermediate similar to the state induced by halogenated pyrimidines was not formed. In actively dividing AKR cell cultures, virus activation appeared to be proportional to the dose of gamma radiation; the estimated frequency of activation was 1 x 10^{-5} to 8 x 10^{-5} per exposed cell, and the efficiency of activation was approximately 0.012 inductions per cell per rad. Other normal primary and established mouse cell cultures tested were not activated by gamma radiation. The requirement of cell division for radiation and chemical activation may reflect some common mechanism for initiation of virus expression.

0747 RECENT DEVELOPMENTS IN RADIATION-INDUCED CARCINOMA OF THE THYROID. (Eng.) Kaplan, E. L. (Univ. Chicago Pritzker Sch. Medicine, 950 East 59th St., Chicago, IL 60637); Taylor, J. *Surg Clin North Am* 56(1): 199-205; 1976.

Recent developments concerning the pathogenesis and prevalence of radiation-induced carcinoma of the thyroid are reviewed and additional new data are presented. At the University of Chicago Hospitals, 40% of patients with a history of irradiation to the neck and a palpable thyroid abnormality were found to have carcinoma of the thyroid at operation. In a study of 100 unselected patients with a history of neck irradiation, 26 had palpatory abnormalities and seven of the 15 who were operated upon had carcinoma of the thyroid. Five of these lesions demonstrated evidence of local invasion or lymph node metastases. This prevalence rate of carcinoma of at least 7% in irradiated patients is the highest yet reported. Thus, the authors suggest a very aggressive position in the treatment of these patients. All patients must be examined carefully. When any palpatory abnormality is present which cannot be explained convincingly by thyroiditis, the patient should be operated upon. Total or near-total thyroidectomy should be performed in each patient by a qualified neck surgeon. In cases of proved carcinoma, a modified radical neck dissection should be added if cervical lymph nodes are clinically involved with tumor. Postoperative thyroid hormone suppression is mandatory and ablation of any residual iodine uptake in the neck or elsewhere by radioactive iodine is advocated. If treatment is aggressive, an excellent prognosis can be expected. However, deaths do occur from this disease.

0748 THYMINE HYDROPEROXIDE AS A MEDIATOR IN IONISING RADIATION MUTAGENESIS.

(Eng.) Thomas, H. F. (Sch. Hygiene Public Health, Johns Hopkins Univ., Baltimore, MD 21205); Herriott, R. M.; Hahn, B. S.; Wang, S. Y. *Nature* 259(5541): 341-342; 1976.

The mutagenic action of chemically synthesized cis-5,6-dihydro-6-hydroperoxy-5-hydroxythymine (6-TOOH) on transforming DNA of Haemophilus influenzae was investigated in order to study the mechanism by which ionizing radiation induces mutations in vivo. Tris-buffered solutions of purified H. influenzae transforming DNA were exposed to 6-TOOH in the presence of a transition metal ion. Changes in the transforming DNA leading to mutations were recognized as new resistance to either of two antibiotics to which H. influenzae is normally sensitive. The frequency of colonies resistant to kanamycin and novobiocin increased linearly with time of exposure to 6-TOOH, and the rate was roughly proportional to the hydroperoxide concentration. Cu^{2+} was much more effective than Co^{2+}, Mn^{2+}, Fe^{2+}, or Zn^{2+} for mutagenic action. The rate of mutagenesis was roughly a direct function of the Cu^{2+} concentration. These results suggest that 6-TOOH in cooperation with some metal ions produces changes in transforming DNA that lead to mutations. Hydrogen peroxide failed to produce mutations in the transforming DNA, indicating that H_2O_2 is not an active intermediate responsible for the mutagenic action of 6-TOOH.

0749 LATE EFFECTS OF X IRRADIATION IN PATIENTS TREATED FOR METROPATHIA HAEMORRHAGICA.

(Eng.) Smith, P. G. (Dept. Health and Social Security, Cancer Epidemiology and Clinical Trials Unit, 9 Keble Rd., Oxford, England); Doll, R. *Br J Radiol* 49(579): 224-232; 1976.

A previously studied cohort of 2,068 patients treated with x-irradiation for metropathia hemorrhagica between 1940 and 1960 was followed up for a further 7 yr. Five hundred women have now died, and 103 have emigrated or could not be traced. The numbers of deaths from different causes were compared with the numbers expected in persons of similar age and sex in the Scottish population. An excess of deaths from leukemia (seven observed, 2.3 expected) and of cancers of the heavily irradiated sites (59 observed, 40.1 expected) continued to be observed five or more years after treatment. There was no indication of any change in the excess death rate, due to cancers of sites in the radiation field, with time since treatment up to at least 20 yr after the radiation exposure. Over the same period the number of deaths from cancer of the breast was below expectation (10 observed, 22.3 expected), and no increased mortality from coronary disease was seen (102 observed, 100.9 expected). The mean dose of radiation to the bone marrow was determined for each woman, and it was estimated that the excess rate of leukemia in the first 20 yr after treatment is about 1.1 per million women per year per rad. The findings of no excess risk of leukemia among women treated with radiation for cancer of the cervix in another study suggests that the simple assumption of a linear dose-response relationship for leukemia is incorrect, at least when high doses of radiation are delivered to a small volume of marrow.

0750 REPARATIVE PROCESSES IN SPLEEN OF RATS IRRADIATED WITH HIGHER DAILY DOSE RATES OF CONTINUOUS IRRADIATION.

(Eng.) Mackova, N. (Faculty of Natural Sciences P. J. Safarik Univ., Moyzesova 11, 040 00 Kosice, Czechoslovakia); Praslicka, M.; Misurova, E. *Biologia (Bratislava)* 30(9): 693-699; 1975.

The repair processes in the spleens of young male Wistar rats at various intervals following continuous irradiation with daily dose rates 50, 100, 200, and 500 R (total dose 1,000 R) and following a single exposure to 1,000 R were evaluated on the basis of histological picture and DNA content. The spleens showed histological evidence of serious injury after the high daily doses 200 and 500 R. Complete repair of the DNA took place within 25 days; restoration of the number of erythroid elements and 70-80% regeneration of the white pulp also took place during this time. The period of 25 days was not sufficient for complete repair of megakaryocytes. After a single irradiation with 1,000 R, no repair was evident after similar histological and DNA studies were undertaken. Thus, the single high exposure causes permanent damage in DNA and histological picture.

0751 RESIDUAL SPLENIC FUNCTION IN THE PRESENCE OF THOROTRAST-ASSOCIATED HEPATIC TUMOR: CASE REPORT.

(Eng.) Spencer, R. P. (Univ. Connecticut Health Center, Farmington, CT 06032); Turner, J. W.; Syed, I. B. *J Nucl Med* 17(3): 200-202; 1976.

The case of a 50-yr-old man having residual splenic function in the presence of a thorotrast-associated hepatic tumor is presented. The patient had received iv colloidal thorium dioxide 27 yr previously. Scintiscans with both ^{99m}Tc-sulfur colloid and ^{131}I-rose bengal revealed an extensive intrahepatic defect. At operation, the lesion proved to be an infiltrating hemangiosarcoma. The spleen was small, but the chronic internal radiation of the spleen had not completely destroyed the function of radiocolloid uptake. A review of the literature disclosed other cases in which the spleen was still capable of accumulating radiocolloid some years after thorotrast administration. The effects of internal radiation dose to the spleen from thorotrast are discussed and compared with the effects of external radiation.

0752 COAL DUST: SOURCE OF PNEUMOCONIOSIS AND LUNG CANCER. (Eng.) Mooney, F. S. (St. Helens and Providence Hosps., Lancashire, England). *Nurs Mirror* 142(6): 46-47; 1976.

0753 RADIATION DOSIMETRY OF ^{204}BI- AND ^{206}BI-CITRATES. (Eng.) Bigler, R. E. (Memorial Sloan-Kettering Cancer Center, 1275 York Ave., New York, NY 10021); Russ, G. A.; Laughlin, J. S. *J Nucl Med* 17(4): 301-304; 1976.

0754 THE INFLUENCE OF WR-2721 ON METASTATIC TUMOR SPREAD AFTER IRRADIATION (Proceedings Abstract). (Eng.) Ullrich, R. L. (Biology Division, Oak Ridge Natl. Lab., Oak Ridge, Tenn. 37830); Jernigan, M. C.; Yuhas, J. M. *IRCS Med Sci (Suppl)* 3(10): 27; 1975.

0755 EFFECTS OF IRRADIATION ON RNA SYNTHESIS PRIMED BY CALF THYMUS DEOXYRIBONUCLEOPROTEIN TREATED WITH SALT AND SALT-UREA. (Eng.) Kobayashi, T. (Faculty Veterinary Medicine, Hokkaido Univ., Sapporo 060, Japan); Hayashi, M.; Yoshii, G. *Biochim Biophys Acta* 425(4): 396-400; 1976.

0756 RADIATION-INDUCED MENINGIOMA: WITH REVIEW OF LITERATURE. (Eng.) Waga, S. (Kyoto Univ. Medical Sch., Kyoto, Japan); Handa, H. *Surg Neurol* 5(4): 215-219; 1976.

0757 INHIBITION OF CELL GROWTH BY NEAR ULTRAVIOLET LIGHT PHOTOPRODUCTS OF TRYPTOPHAN. (Eng.) Zigman, S. (Univ. Rochester Sch. Medicine Dentistry, Rochester, NY 14642); Hare, J. D. *Mol Cell Biochem* 10(3): 131-135; 1976.

0758 CANCER OCCURRENCE AFTER REPEATED FLUOROSCOPY DURING PNEUMOTHORAX THERAPY (Proceedings Abstract). (Eng.) Uzman, B. G. (Louisiana State Univ. Medical Center, Shreveport, LA 71105). *IRCS Med Sci (Suppl)* 3(10): 30; 1975.

0759 STUDIES OF INJECTED ^{237}Pu(IV) CITRATE IN BEAGLES. (Eng.) Lloyd, R. D. (Univ. Utah Coll. Medicine, Salt Lake City, UT 84132); Atherton, D. R.; McFarland, S. S.; Mays, C. W.; Stevens, W.; Williams, J. L.; Taylor, G. N. *Health Phys* 30(1): 47-52; 1976.

See also:

* (Rev): 0610, 0611, 0612
* (Chem): 0666
* (Viral): 0836, 0852
* (Immun): 0884, 0937, 0940
* (Path): 1060
* (Epid-Biom): 1096, 1110, 1116

0760 EXPRESSION OF ENDOGENOUS ALV ANTIGENS AND SUSCEPTIBILITY TO SUBGROUP E ALV IN THREE STRAINS OF CHICKENS (ENDOGENOUS AVIAN C-TYPE VIRUS). (Eng.) Robinson, H. L. (Stanford Univ. Sch. Medicine, Stanford, CA 94305); Lamoreux, W. F. *Virology* 69(1): 50-62; 1976.

Cells from three strains of Kimber Farms chickens, K16, K18, and K28, have been characterized for the expression of endogenous avian C-type virus (ALV) antigens and for susceptibility to subgroup E ALV. In K16 the coordinate dominant expression of chick helper factor (chf), the type specific antigen of endogenous subgroup E ALV, and the group specific (gs) antigen of ALV were observed. The expression of chf and gs antigen in K16 chf+gs+ cells was similar to that observed in SPAFAS and H & N gs+ (chicken) cells. In K18 chf but not gs antigen was expressed. The expression of chf in K18 chf+gs+ cells was distinct from that observed for the chf+ gs+ pedigrees but similar to that found in SPAFAS chf+gs- helper extremely high (hE) cells. Cells from K16 and K18 chickens were uniformly resistant to subgroup E ALV. In cells from K28 chickens, susceptibility to subgroup B virus correlated with susceptibility to subgroup E virus. The efficiency of plating of subgroup E virus on susceptible K28 cells was 10^3 to 10^4-fold lower on chf+ cells than on chf- cells.

0761 RENAL NEOPLASTIC RESPONSE TO LEUKOSIS VIRUS STRAINS BAL A (AVIAN MYELOBLASTOSIS VIRUS) AND MC29. (Eng.) Beard, J. W. (Life Sciences Res. Lab., Saint Petersburg, FL 33710); Chabot, J. F.; Beard, D.; Heine, U.; Houts, G. E. *Cancer Res* 36(2): 339-353; 1976.

Studies of the induction of avian renal neoplasms by leukosis virus strains BAI A[avian myeloblastosis virus (AMV)] and MC29, confirmed evidence of the origin of the tumors from embryonal cells residual in the posthatched chick. Embryonal rests consisted of two types of cells, those of epithelial characteristics and a second element of differentiation between nephroblastema (mesenchyme) and epithelium and designated here as nephromesoblastoma. Infection by AMV induced tumors of epithelial characteristics and, in addition, derivatives of nephromesoblastoma consisting of cartilage, bone, areas of keratinization, and sarcoma. Keratinized structures in the nephroblastoma originated from nephromesoblastoma. In contrast, MC29 virus induced only epithelial growths representing principally aberrant and malformed glomerular and tubular structures with occasional cartilage derived from epithelial cells. MC29 tumors were completely lacking in nephromesoblastoma tissue and contained no bone, sarcoma, or keratinized formations. In MC29 tumors, occasional cartilage was derived from epithelium. Tumors caused by AMV exhibited the complex structure of nephroblastoma with all of the features of the growth in humans (Wilms' tumor). The neoplasms induced by both AMV and MC29 exhibited marked aberration, distortion, and malformation in the differentiation of the cells growing out from the embryonal rests representing rare manifestations of cell genetic influence. The results illustrate fundamental differences in cellular composition and capacity to respond to etiologicaly different leukosis viruses.

0762 TRANSCRIPTION OF SINGLE BASE OLIGONUCLEOTIDES BY RIBONUCLEIC ACID-DIRECTED DEOXYRIBONUCLEIC ACID POLYMERASE. (Eng.) Falvey, A. K. (Natl. Heart and Lung Inst., Natl. Inst. Health, Bethesda, MD 20014); Weiss, G. B.; Kreuger, L. J.; Kantor, J. A.; Anderson, W. F. *Nucleic Acids Res* 3(1): 79-88; 1976.

The synthesis of DNA products complementary to artificial templates by the enzyme RNA-directed DNA polymerase isolated from avian myeloblastosis virus was studied. Of the single base polyribonucleotides, poly(rC), poly(rA), and poly(rI) were active while poly(rG) and poly(rU) were almost inactive. The minimum length showing activity for an oligo(rC) template was 9; the minimum primer length of oligo(dG) was 3 or 4. Using $(rC)_{13}$ as template and $(dG)_8$ as primer, the oligo(dG) product coelectrophoresed with the template. However, using $(rA)_{20}$ as template and $(dT)_{10}$ as primer, a large (10-16S) product was formed. Similarly, using oligo(rI) (2.5S) as template and $(dC)_{10}$ as primer, a large (greater than 22S) product was formed. No significant activity was obtained with oligo(rU) templates. RNA-directed DNA polymerase transcribed the various oligonucleotides differently: there was slippage with oligo(rA) and oligo(rI), faithful transcription with oligo(rC), and poor transcription with oligo(rU).

0763 COOPERATIVE TRANSFORMATION STUDIES WITH TEMPERATURE-SENSITIVE MUTANTS OF ROUS SARCOMA VIRUS. (Eng.) Balduzzi, P. C. (Univ. Rochester Sch. Medicine and Dentistry, Rochester, NY 14642). *J Virol* 18(1): 332-343; 1976.

Stocks of Rous sarcoma virus Bryan strain were mutagenized by a bromodeoxyuridine treatment immediately after infection. Thirty temperature-sensitive (ts) mutants defective in transformation (td) were isolated by a replica plating technique. Twenty of these mutants were preliminarily characterized and found to be defective in late functions related to transformation. These mutants were used in experiments of cooperative transformation with four Prague strain td ts mutants of different cotransformation groups. A small number of Bryan ts mutants cooperated with some of the Prague mutants in transforming chicken embryo cells at the nonpermissive temperature. However, the amount of cotransformation observed was lower than that observed with cooperating Prague ts mutants, and no clear-cut pattern of cotransformation was obtained in Prague and Bryan crosses. Indirect evidence indicates that cooperative transformation is the result of recombination events. If cooperative transformation depends on genetic homology, this type of study could supplement the results of molecular hybridization studies on the similarities in the transforming genes of different isolates of avian sarcoma viruses.

0764 TEMPERATURE-SENSITIVE MUTANTS OF AVIAN SARCOMA VIRUSES: GENETIC RECOMBINATION WITH WILD TYPE SARCOMA VIRUS AND PHYSIOLOGICAL ANALYSIS OF MULTIPLE MUTANTS. (Eng.) Hunter, E. (Univ. Southern California Sch. Medicine, 2025 Zonal Ave., Los Angeles, CA 90033); Vogt, P. K. *Virology* 69(1): 23-34; 1976.

Genetic recombination experiments were done to analyze the genotype of two coordinate temperature sensitive (ts) mutants of the avian sarcoma viruses, LA334 and LA338. Recombination between Prague strain B of Rous sarcoma virus (PR-B) and LA334 resulted in progeny consistent with the mutant having two lesions, one affecting the maintenance of transformation, the other replication of infectious virus. LA338 appears to possess at least three mutations; one is similar to that in LA334 and affects the maintenance of transformation; a second prevents the synthesis of infectious virus at the restrictive temperature; the third affects an early function necessary to initiate transformation. The early defect can be complemented by and is lost on recombination with leukosis viruses. Temperature shift experiments confirmed that the defective replication functions in LA334 and LA338 are late and reversible. They can both be complemented by leukosis viruses, but appear to affect different stages in replication. In fluorescent antibody studies at the nonpermissive temperature, LA334-infected cells contained normal levels of the major viral structural polypeptides; LA338-infected cells contained reduced amounts. High frequency recombination was observed between host range and transformation markers. Of the 12 recombinant clones of LA334, 10 recombined in the part of the genome containing the replication defect, but retained the host range genes of the mutant. Apparently the defect of LA334 is not in the host-range genes.

0765 GLYCEROL PHOSPHATE SHUTTLE IN VIRUS-TRANSFORMED CELLS IN CULTURE. (Eng.) Bissell, M. J. (Lab. Chemical Biodynamics, Lawrence Berkeley Lab., Univ. California, Berkeley, CA 94720); Rambeck, W. A.; White, R. C.; Bassham, J. A. *Science* 191(4229): 856-858; 1976.

The glycerol phosphate shuttle was investigated in normal and Schmidt-Ruppin strain of Rous sarcoma virus (subgroup A)-transformed 10-day-old chick embryo cell cultures. The virus was added at a multiplicity of 0.2 infectious units to half the cells from a single embryo at seeding. The rate of ^{14}C flow from uniformly labeled [^{14}C]glucose into glycerol phosphate was measured; the initial rate of flow as well as the final level was three- to six-fold higher in transformed cultures than in normal cells; this indicated that lactate dehydrogenase (LDH) is present and more active in transformed cells. It was found that glycerol phosphate dehydrogenase (GPDH) was also present and active in transformed cells and that the activities of LDH and GPDH are comparable in normal and transformed cells. Since LDH level and activity are higher in transformed cells than in normal cells, the GPDH activity must also be higher to give comparable ratios of the two enzyme activities.

0766 AN AVIAN SARCOMA VIRUS MUTANT THAT IS TEMPERATURE SENSITIVE FOR VIRON ASSEMBLY. (Eng.) Hunter, E. (Univ. Southern California Sch. Medicine, 2025 Zonal Ave., Los Angeles, CA 90033); Hayman, M. J.; Rongey, R. W.; Vogt, P. K. *Virology* 69(1): 35-49; 1976.

The temperature-sensitive defect in replication of LA334, a double mutant of Rous sarcoma virus, has been characterized both biologically and biochemically. This mutant is complemented for replication at the nonpermissive temperature by both leukosis virus and by RSV(-). Both experiments indicate that LA334 synthesizes functional glycoproteins at the restrictive temperature. In the following experiments, the recombinant virus LA3342 was used; this mutant transforms cells at both 35 C and 41 C. Cells were infected at 35 C, then shifted to 41 C when confluently infected. Interference experiments showed that LA3342 induced resistance at 41 C against superinfection with viruses of subgroup C. Noninfectious virus particles were synthesized at 41 C and had a higher density in sucrose gradients (1.175 g/ml) compared to those produced at 35 C. (1.15 g/ml). These noninfectious virions contained four novel polypeptides; at least three appeared to be viral in origin. The rate of cleavage of the polyprotein precursor to nonglycosylated structural polypeptides was reduced significantly at the restrictive temperature. Addition of cycloheximide to infected cultures did not prevent the rapid production of infectious virus, seen on shifting cells from the restrictive to the permissive temperature. This finding suggests that proteins synthesized at 41 C can be processed correctly at 35 C. Large budding structures lacking the characteristic morphology of C-type particles were visible in electron micrographs of cells infected with the mutant at the nonpermissive temperature. The mutation affecting replication in LA3342 appears to be in the gene coding for one of the nonglycosylated structural proteins.

0767 HUMORAL IMMUNE RESPONSES OF CATS TO MAMMALIAN TYPE-C VIRUS P30S. (Eng.) Charman, H. P. (Flow Lab., Inc., 1710 Chapman Ave., Rockville, MD 20852); Gardner, M. B.; McAllister, R. M.; Kim, N.; Gilden, R. V. *Int J Cancer* 17(1): 98-108; 1976.

Natural and experimental cat sera were tested in radioimmune precipitation assays vs purified p30s from feline leukemia virus (FeLV), RD114 and murine leukemia virus (MuLV). Antibodies with specificity for FeLV p30 comparable to hyperimmune sera from heterologous species but of low titer were found in a high percentage of normal cats from households with a high incidence of FeLV and neoplasia. Sera from cats with neoplasms were generally negative. Cats immunized with FeLV gave low-level immune response, also of the same general specificity as heterologous hyperimmune sera. Cat sera do not normally show antibody to RD114 p30 although two immunized weanling cats produced low titered but highly specific p30 antibody. Thus, for both classes of feline type-C virus p30s, there was an evident capability of the cat to mount an immune response to natural or experimental exposure to the respective proteins. The magnitude of the response was between 100- and 1,000-fold below that seen in heterologous species. In contrast, cats immunized with MuLV p30 gave immune responses comparable to those seen in guinea pigs, rabbits and goats. Several very old cats with carcinoma had antibody which preferentially precipitated MuLV p30. A competition assay using one such serum and labeled MuLV p30 was inhibited by FeLV, RD114, and MuLV p30s. This indicates that the assay is ''interspecies'' in nature. Among the possible explanations of this reaction category is that it represents antibody to the p30 of an as yet undefined class of feline type-C virus.

0768 AN IMPROVED ASSAY FOR FELINE LEUKAEMIA VIRUS PSEUDOTYPES OF MURINE SARCOMA VIRUS. (Eng.) Russell, P. H. (Univ. Glasgow, Veterinary Sch., Bearsden, Glasgow G61 1QH, Scotland); Jarrett, O. *J Gen Virol* 31(1): 139-143; 1976.

An assay is described for feline leukemia virus pseudotypes of murine sarcoma virus which increased the virus titer by about 100-fold over conventional assays. The titer is independent of dilution and no secondary focus formation occurs. The assay may be used to study virus neutralization and to detect and type feline leukemia virus subgroup in feline embryo cells by interference.

0769 PROPERTIES OF MOUSE LEUKEMIA VIRUSES: X. OCCURRENCE OF VIRAL STRUCTURAL ANTIGENS ON THE CELL SURFACE AS REVEALED BY A CYTOTOXICITY TEST. (Eng.) Hunsmann, G. (Max-Planck-Institut fuer Virusforschung, Tuebingen, W. Germany); Claviez, M.; Moenning, V.; Schwarz, H.; Schaefer, W. *Virology* 69(1): 157-168; 1976.

Rabbit antisera directed against the major structural antigens of Friend leukemia virus (FLV) were used to test a variety of mammalian cell lines in a complement-dependent cytotoxic assay. A strong reaction was obtained with proteins GP71 and P12 antisera on several lines of murine C-virus-producing cells. P12 antiserum revealed type-specific reactivity; GP71 antiserum, type- and group-specific reactivity. The latter showed a weak, but reproducible interspecies reactivity, detectable with FeLV-F422 cat cells producing classical feline virus but not with two simian cell lines producing gibbon and woolly monkey C-type viruses. P10, P15, and P31 antigens acted as cytotoxic targets only on a single murine cell line (FLV-Eveline) producing large quantities of Friend leukemia virus; they produced only 50-75% lysis, compared to 100% by P12 and GP71 antigens. All of the lines of murine sarcoma virus-transformed nonproducer cells examined (K Balb, MSV85, and HT-1) were negative when reacted with the P10, P12, P15, P31, and GP71 antisera. The GP71 cytotoxic target antigen appears to be on the viral surface and that of P12, in the virus particle.

0770 PROPERTIES OF MOUSE LEUKEMIA VIRUSES: XI. IMMUNOELECTRON MICROSCOPIC STUDIES ON VIRAL STRUCTURAL ANTIGENS ON THE CELL SURFACE. (Eng.) Schwarz, H. (Max-Planck-Institut fuer Virusforschung, Tuebingen, W. Germany); Hunsmann, G.; Moenning, V.; Schaefer, W. *Virology* 69(1): 169-178; 1976.

The occurrence and distribution of viral structural antigens on C-virus producing and/or transformed cells was studied. Sera specific for Friend leukemia virus (FLV) components were used. GP71 and P12 viral structural antigens were demonstrated on the surface of murine C-virus-producing (FLV-Eveline and freshly infected FLV-STU cells) but not on nonproducing transformed K Balb, MSV85 and HT-1 cells. GP71 serum revealed a type- and group-specific reactivity but failed to demonstrate an interspecies antigenic determinant, probably because of its relatively low corresponding titer. P12 antiserum reacted mainly type-specifically. By this method, P10, P15, and P31 antigens were not detectable in significant amounts with the possible exception of P31 antigen on the highly producing FLV-Eveline cell. GP71 antigen occurred on the viral surface as well as on nonbudding areas of the cell membrane. P12 antigen was absent on virus particles but relatively abundant on nonbudding areas of the cell surface. No difference in the distribution of type- and group-specific determinants of GP71 was recognizable, and no clusters of the antigens studied were observed on the membrane under the conditions used. These results suggest that, among the virus structural antigens, only GP71 and P12 antigens are integral surface constituents of the cells investigated and that none of the antigenic determinants studied is a murine C-virus-induced tumor-specific cell surface antigen. It appears that the type- and group-specific murine Ve antigens are located in a single molecule. GP71 and P12 appear to be the most promising components for use in immunization. The cross-reactivity of GP71 may indicate that its immunogenic potency may extend to leukemias of other species.

0771 IMMUNOSUPPRESSION INDUCED IN VITRO BY CELL-FREE EXTRACTS OF FRIEND LEUKEMIA VIRUS-INFECTED SPLENOCYTES. (Eng.) Specter, S. (Albert Einstein Medical Center, Northern Div., York and Tabor Rds., Philadelphia, PA 19141); Patel, C.; Friedman, H. *J Natl Cancer Inst* 56(1): 143-147; 1976.

The immunologic responsiveness by normal BALB/c spleen lymphocytes immunized in vitro with sheep erythrocytes was markedly suppressed by clarified cell-free homogenates of Friend leukemia virus (FLV)-infected mouse spleens. Suppression was achieved with a 3,000 x *g* supernatant of FLV-containing homogenates freed of cellular debris but not with crude unclarified homogenates or pelleted material after centrifugation. The immunosuppressive effects of the virus were dose-dependent, whether the virus was added directly to the target spleen cells or separated from them by a 0.4 μm Nucleopore filter. Suppression was prevented by heating of the virus at 100 C for 10 min or by neutralization with antiserum to FLV. Addition of the virus as late as 48 hr after in vitro immunization of splenocytes affected the immune response. However, suppression was maximum when the clarified virus was added to the splenocytes 1 or 2 days before immunization. The authors conclude that the agent in the FLV-infected spleen homogenates responsible for immunosuppression appeared to be the virus per se; however, virus-associated soluble factor(s) might have been involved.

0772 T-LYMPHOCYTE RESPONSE TO FRIEND VIRUS-INDUCED TUMOR CELL LINES IN MICE OF STRAINS CONGENIC AT H-2. (Eng.) Blank, K. J. (Albert Einstein Coll. Medicine, Bronx, New York, NY 10461); Freedman, H. A.; Lilly, F. *Nature* 260 (5548): 250-252; 1976.

The immune response of syngeneic or semi-syngeneic mice to cultured cell lines derived from tumors induced in vivo by Friend murine erythroleukemia virus (FV) was studied. The mice used were of strains congenic at the H-2 region on the BALB/c (H-2d) background. BALB.B, BALB.K and (BALB.B x BALB.K)F$_1$ mice were immunized by ip inoculation with H-2-compatible HFL series tumor cells. Lymphocyte-mediated cytotoxicity, using ^{51}Cr-labeled cultured tumor cells or phytohemagglutinin-induced blasts originating from mice of the same congenic strains as targets, was completely abolished by pretreating the immune peritoneal exudate cells (PEC) with anti-Thy-1.2 and complement. Pretreating the immune PEC with normal mouse serum or goat anti-mouse IgG and complement or incubating the PEC at 37 C for 45 min on a nylon column had no effect on ^{51}Cr release. Thus, target-cell killing was mediated by T-lymphocytes. PEC from the (BALB.B x BALB.K)F$_1$ mice immunized with HFL/k killed only HFL/k and HFL/bk but not HFL/b target cells, although the immune PEC possessed an H-2 haplotype in common with all three target cells. Similarly, PEC from F$_1$ mice immunized with HFL/b killed HFL/b but not HFL/k target cells. These results show that the H-2 type of the cells used for immunization is a decisive factor in the specificity of the killer cells generated.

0773 CYTOFLUOROMETRIC STUDIES ON CONFORMATION OF NUCLEIC ACIDS IN SITU. I. RESTRICTION OF ACRIDINE ORANGE BINDING BY CHROMATIN PROTEINS. (Eng.) Traganos, F. (Memorial Sloan-Kettering Cancer Center, 1275 York Ave., New York, NY 10021); Darzynkiewicz, Z.; Sharpless, T.; Melamed, M. R. *J Histochem Cytochem* 24(1): 40-48; 1976.

Binding of the fluorochrome acridine orange (AO) to nucleic acids in situ was studied by automated cytofluorometry in two differentiating cell systems: Friend virus-transformed murine erythroleukemia induced to differentiate by dimethyl sulfoxide, and phytohemagglutinin-stimulated human lymphocytes. The specificity of the stain for deoxyribonucleic acid (DNA) is discussed on the basis of data obtained by cell treatment with nucleases. Evidence is presented that in the case of Friend leukemia cells, but not phytohemagglutinin-stimulated lymphocytes, a significant change in the number of AO-intercalating sites in DNA occurs during differentiation. These results suggest that changes in nuclear chromatin occurring during cell differentiation may be correlated, in some but not all systems, with changes in accessibility of DNA in situ to intercalating dyes. The role of divalent cations, especially Mg^{2+}, in the conformation of nuclear chromatin and in modulation of the accessibility of nucleic acids to AO is discussed. The method provides a tool for the study of nucleic acid-protein interaction in situ, and in some cell systems it may be applicable as a marker for recognition of cell transformation, differentiation or neoplasia.

0774 HOST RESTRICTION OF FRIEND LEUKEMIA VIRUS COAT PROTEIN SYNTHESIS. (Eng.) Ray, U. (Dept. Cell Biology, Albert Einstein Coll. Medicine, Bronx, NY 10461); Soeiro, R.; Fields, B. N. *J Virol* 18(1): 370-373; 1976.

Fv-1 gene-mediated host restriction of Friend leukemia virus replication was investigated in terms of coat protein synthesis. Assay of pseudotype formation with vesicular stomatitis virus showed that under restricting growth conditions, the availability of leukemia virus coat protein for pseudotype formation was decreased. These studies appear to eliminate a pure assembly defect as the mechanism of *Fv-1* host restriction, and they suggest that the gene effect is mediated before viral assembly, perhaps at the level of mRNA transcription or the translation of viral-specific proteins.

0775 CRYOPROTECTIVE AGENTS AS INDUCERS OF ERYTHROLEUKEMIC CELL DIFFERENTIATION IN VITRO. (Eng.) Preisler, H. D. (Roswell Park Memorial Inst., 666 Elm St., Buffalo, NY 14263); Christoff, G.; Taylor, E. *Blood* 47(3): 363-368; 1976.

The ability of families of compounds with known and potential cryoprotective properties to induce the differentiation of Friend leukemia cells in vitro was studied. For each agent [dimethylsulfoxide (DMSO) dimethylacetamide, N-methylacetamide, acetamide, tetramethylurea, dimethylurea, dimethylformamide, methylformamide, formamide, pyridazine and pyridine N-oxide], the proportion of differentiated cells in the culture and the total amount of heme per 10^7 cells were determined. Within each family of compound there was a direct correlation between a compound's cryoprotective ability, its ability to donate electro pairs for hydrogen bonding (basicity), and its abilit to induce differentiation. While individual agents differed with respect to the differentiation induction rate, the biology of differentiation appeared to be similar, regardless of the agent used. All compounds caused a slight and temporary lag in cell growth, and the major increase in the number of differentiated cells in the culture occurred during a two-to-three day period. It was concluded that while all penetrant cryoprotective compounds tested appeared to have some inducing ability, the basicity of the individual cryoprotector largely determines the magnitude of the induction of differentiation; that the kinetics of appearance of differentiated cells is similar for all the compunds tested; and that cells which are refractory to the inducing effects of DMSO can respond to other inducing compounds.

0776 BACTERIAL LIPOPOLYSACCHARIDES AS HELPER FACTORS FOR FRIEND SPLEEN FOCUS-FORMING VIRUS IN MICE. (Eng.) Steeves, R. A. (Albert Einstein Coll. Medicine, Bronx, NY 10461); Grundke-Iqbal, I. *J Natl Cancer Inst* 56(3): 541-546; 1976.

The distinguishing features of the two effects of bacterial lipopolysaccharide (LPS) (as enhancing agent or as helper factor) on Friend spleen focus-forming virus (SFFV) were studied in mice. Strains used included DBA/2, BALB/c, C3H/HeJ, NIH Swiss, and (BALB/c x DBA/2)F_1. The enhancing effect was optimal when LPS was injected 5 days before SFFV, but was nil when LPS and SFFV were given at the same time. In contrast, in mice genetically resistant to the native helper virus of SFFV, the helper effect of LPS was optimal when it was injected with SFFV, and nil when given 5 days before or after the virus. LPS did not affect helper virus expression in a standard cell culture (XC) assay, but it did increase helper virus replication in mice. Mice lacking T cells or complete endogenous murine leukemia virus genomes were as sensitive to the helper effects of LPS on SFFV expression as were control animals. Most of the helper activity of LPS is associated with the lipid A component. The helper effect of lipid A did not occur in fully susceptible hosts, but only in hosts carrying resistance alleles at either the Fv-1 or the Fv-2 locus.

0777 PREVENTION OF VIRAL CHEMICAL CO-CARCINOGENESIS IN VITRO BY TYPE-SPECIFIC ANTI-VIRAL ANTIBODY. (Eng.) Price, P. J. (Microbiological Associates, Bethesda, MD 20014); Bellew, T. M.; King, M. P.; Freeman, A. E.; Gilden, R. V.; Huebner, R. J. *Proc Natl Acad Sci USA* 73(1): 152-155; 1976.

The effect of type-specific anti-viral antibody on low passage Fischer rat embryo cultures chronically infected with Rauscher murine leukemia virus, which are highly susceptible to transformation by 3-methylcholanthrene, was investigated. As determined by an assay for RNA-dependent DNA polymerase, these cultures were found to be completely protected from transformation by methylcholanthrene when treated with a 1:50 dilution of neutralizing antibody specific for the leukemia virus prior to and during treatment with methylcholanthrene (0.5 μg/ml). Sister cultures F119 and F115 were not protected by neutralizing antibody specific for the B-tropic Kaplan radiation leukemia virus (1:240, 1:480, 1:960, and 1:1,920). This clearly demonstrates a definite type-specific role for Rauscher murine leukemia virus in the 3-methylcholanthrene transformation system in rats.

0778 METHOD FOR REPRODUCIBLE LARGE-VOLUME PRODUCTION AND PURIFICATION OF RAUSCHER MURINE LEUKEMIA VIRUS. (Eng.) Johnson, R. W. (Natl. Cancer Inst., Frederick, MD 21701); Perry, A.; Robinson, O. R., Jr.; Shibley, G. P. *Appl Environ Microbiol* 31(2): 182-188; 1976.

Procedures used to reproducibly produce and purify large volumes of Rauscher murine leukemia virus are described. Rauscher murine leukemia virus was produced in roller-bottle cultures of chronically infected JLS-V9 cells. Virus from this culture fluid was concentrated and purified by two semi-isopyenic bandings in sucrose gradients. Virus material obtained from young, nonconfluent cultures (early-harvest virus) yielded products characteristically containing endogenous ribonucleic acid-dependent DNA polymerase with high specific activity (400-1,000 pM of [^{3}H]thymidine 5'-triphosphate incorporated per milligram of protein per hour). Fluids obtained from older confluent cultures (late-harvest virus) yielded products with endogenous RNA-dependent DNA polymerase with little or no specific activity (200 pM or less of [^{3}H] thymidine 5'-triphosphate incorporated per milligram of protein per hour), but with higher virus particle counts and greater amounts of protein and group specific antigen than the early-harvest products.

0779 IN VITRO TRANSFORMATION OF MURINE ERYTHROID CELLS BY RAUSCHER LEUKEMIA VIRUS. (Eng.) Nooter, K. (Radiobiological Inst. TNO, 151 Lange Kleiweg, Rijswijk (ZH) The Netherlands); Bentvelzen, P. *Cancer Lett* 1(3): 155-159; 1976.

Incubation of BALB/c mouse bone marrow cells with Rauscher leukemia virus induced a high rate of erythropoietin-independent erythroid colony formation in vitro. Transformation could be prevented by incubation with specific antiserum. Mammary tumor virus or a myeloid leukemia virus did not induce this form of transformation. A linear dose-response rate of transformation was observed.

0780 AUTOLOGOUS IMMUNE RESPONSES TO THE MAJOR ONCORNAVIRUS POLYPEPTIDES IN UNMANIPULATED AKR/J MICE. (Eng.) Oldstone, M. B. A. (Scripps Clinic and Res. Foundation, La Jolla, CA 92037); Del Villano, B. C.; Dixon, F. J. *J Virol* 18(1): 176-181; 1976.

The autologous immune response of AKR/J mice to the structural proteins of murine leukemia virus (MuLV) was examined. Immunoglobulins from the renal glomeruli were chemically eluted, separated from antigens, recovered, and tested for immunological reactivity against MuLV structural proteins. Analysis of immune precipitates obtained after mixing radiolabeled, Tween-disrupted, MuLV preparations with eluates from AKR/J mice on sodium dodecyl sulfate-gel electrophoresis showed evidence of antibodies to the major classes of MuLV structural components: gp70, gp45, p30, and one or more proteins in the 10,000- to 15,000-dalton class. Rate zonal centrifugation confirmed that the eluates from AKR/J glomeruli contained antibody(s) that bound specifically to p30. It is presumed that all multiple antibodies against the oncornavirus had contributed to the immune complex deposits and any resultant disease. These results indicate that AKR/J mice spontaneously mounted immune responses against the major oncornavirus polypeptide antigens.

0781 INDUCTION OF A NOVEL TRANSFORMING VIRUS (MSV-Z) FROM SARCOMA-POSITIVE LEUKEMIA-NEGATIVE 3T3FL MOUSE CELLS. (Eng.) Nomura, S. (Viral Leukemia and Lymphoma Branch, Natl. Cancer Inst., Bethesda, MD 20014); Fischinger, P. J.; Hartley, J. W.; Mattern, C. F. T. *Virology* 69(2): 635-646; 1976.

Preparation of particles spontaneously released from S+L- cells were found to contain murine sarcoma virus (MSV) which, upon coinfection with mouse-tropic murine leukemia virus (MuLV), was capable of transforming SC-1 cells, a cloned line derived from wild-mouse embryo. This transforming virus was tentatively designated as murine sarcoma virus-zero (MSV-Z). No productive infection was detected following infection with MSV-Z alone, but in the presence of MuLV, infection of SC-1 cells with MSV-Z resulted in replication of MSV(MuLV) and MuLV. Exposure of S+L- cells to 5-iododeoxyuridine increased the titer of transforming virus up to 400-fold, but no comparable increase in reverse transcriptase activity or number of physical particles was detected. No replicating MuLV or xenotropic murine oncornavirus was detected after chemical induction. The peak of transforming activity of MSV-Z was found at a buoyant density 1.15 g/cm^3 in sucrose gradients. MSV-Z could not be induced from S+L- reverant cell lines. Sensitivity to MSV-Z transformation appears to be limited to the SC-1 cell line, although some activity was detected upon infection of normal rat kidney cells. Based on glycoprotein interference and neutralization tests, the viral envelope of MSV-Z was found to be distinct from the previously described murine C-type oncornaviruses.

0782 ELIMINATION OF THE SARCOMA GENOME FROM MURINE SARCOMA VIRUS TRANSFORMED CAT CELLS. (Eng.) Frankel, A. E. (Natl. Cancer Inst., Bethesda, MD 20014); Haapala, D. K.; Neubauer, R. L.; Fischinger, P. J. *Science* 191(4233): 1264-1266; 1976.

Evidence is presented for the loss of a transforming sarcoma genome in cloned, spontaneous revertant cell lines obtained from a Moloney murine sarcoma virus-transformed cat cell line. The revertant cell lines had no evidence of the sarcoma genome in the cell RNA or DNA as determined by RNA-complementary DNA or DNA-complementary DNA hybridizations and analysis by hydroxylapatite chromatography. This is the first report of loss of a transforming genome in a revertant cell line.

0783 FURTHER IMMUNIZATION STUDIES WITH MAMMARY TUMOR VIRUS. (Eng.) Charney, J. (Inst. Medical Res., Camden, NJ 08103); Holben, J. A.; Cody, C. M.; Moore, D. H. *Cancer Res* 36(2): 777-780; 1976.

The protection of young C57BL mice, substrains R111f and Af, against future viral challenge by an im inoculation with formalin-inactivated murine mammary tumor virus in Freund's complete adjuvent was studied. A single im dose of virus greatly reduced viral expression and mammary tumorigenesis in Af (tumor incidence, 39%) and R111f (tumor incidence, 11%) mice, which carry only endogenous, gamete-transmitted virus. In C57BL mice, 1 μg of vaccine in Freund's complete adjuvant protected against later challenge with R111 virus.

0784 CHARACTERIZATION OF MOUSE MAMMARY TUMOR VIRUSES FROM PRIMARY TUMOR CELL CULTURES: I. IMMUNOLOGIC AND STRUCTURAL STUDIES. (Eng.) Kimball, P. C. (Natl. Cancer Inst., Bethesda, MD 20014); Boehm-Truitt, M.; Schochetman, G.; Schlom*, J. *J Natl Cancer Inst* 56(1): 111-117; 1976.

Primary cell cultures of mammary tumors from RIII, GR, DD, BALB/cfC3H, and BALB/c mice were prepared by trypsin-EDTA dissociation of tumors in order to characterize, structurally and immunologically, the viruses produced by such cell cultures. Characterization was accomplished by radioimmunoprecipitation assays for mouse mammary tumor viruses (MuMTV) and murine leukemia virus (MuLV) antigens, and by analysis of virus proteins and glycoproteins by gel electrophoresis. Cultures from these strains contained predominantly cells of epithelial morphology which formed three-dimensional domelike structures. Cultures from RIII, GR, DD, and BALB/cfC3H tumors produced extracellular type-B MuMTV, either in the absence of detectable type-C virus or with less than 1% contamination with type-C virus. Only BALB/c cultures produced MuMTV with as much as 3% contaminating MuLV. High levels of MuMTV surface antigen were also found in soluble form in culture supernatants. Virus polypeptide analyses showed that the RIII, BALB/cfC3H, DD, and BALB/c viruses all contained polypeptides characteristic of MuMTV. The authors conclude that primary cultures of mammary tumor cells make available a source of purified MuMTV antigens, structural proteins, and nucleic acids for comparative studies of MuMTV from various mouse strains.

0785 CHARACTERIZATION OF MOUSE MAMMARY TUMOR VIRUSES FROM PRIMARY TUMOR CELL CULTURES. II. BIOCHEMICAL AND BIOPHYSICAL STUDIES. (Eng.)

Kimball, P. C. (Natl. Cancer Inst., Bethesda, MD 20014); Michalides, R.; Colcher, D.; Schlom, J. *J Natl Cancer Inst* 56(1): 119-124; 1976.

Primary mammary tumor cultures of RIII, GR, DD, BALB/c, and BALD/cfC3H mice were examined for mouse mammary tumor virus (MuMTV) production and the components of these viruses were characterized biochemically and biophysically. Levels of production of 12 to 32 μg virus protein/day/75-cm^2 culture flask could be maintained for 30 to 50 days with daily virus harvests. The viruses from tumor cell cultures of these mouse strains contained DNA polymerase with a strong preference for Mg++ over Mn++ as the divalent cation, a characteristic of DNA polymerase of MuMTV from mouse milk. These viruses from tumor cell cultures were excellent sources of MuMTV ^{3}H-complementary DNA (complexed to 60 to 70S RNA) and radioactive 60 to 70S RNA, sufficiently free of contaminating murine leukemia virus nucleic acids, that can be used in molecular hybridization experiments. The effects of several culture parameters on MuMTV production were also studied. These experiments, combined with previous immunologic and structural studies, show that primary cultures of mammary tumor cells are useful sources for comparative studies of MuMTV from several mouse strains.

0786 BIOCHEMICAL AND PHYSIOLOGICAL MECHANISMS IN GLUCOCORTICOID HORMONE INDUCTION OF MOUSE MAMMARY TUMOR VIRUS. (Eng.) Scolnick, E. M. (National Cancer Inst., Bethesda, MD 20014); Young, H. A.; Parks, W. P. *Virology* 69(1): 148-156; 1976.

The mechanisms by which both constitutive and glucocorticoid-induced levels of mouse mammary tumor virus (MMTV) RNA can vary over 100-fold ranges were investigated in clones of cell lines (C3H MT) derived from mammary adenocarcinomas. MMTV-RNA increased 30-50% within 1 hr after addition of 5 μg/ml dexamethasone. This increase was inhibited by 5 μg/ml of actinomycin D, but not by cytosine arabinoside (5 μg/ml), hydroxyurea (10 μg/ml), or cycloheximide (100 μg/ml). It does not require new cellular protein or DNA synthesis. Increases in viral RNA precede increases in viral proteins. The identical kinetics of induction of RNA in the clone with low and high constitutive levels of MMTV-RNA suggested that the increases in MMTV-RNA may occur primarily via increases in the rate of synthesis of MMTV viral RNA.

0787 *HIN* D RESTRICTION MAPPING OF UNPAIRED REGIONS IN SIMIAN VIRUS 40 SUPERHELICAL DNA I: CONSIDERATIONS REGARDING STRUCTURE-FUNCTION RELATIONSHIPS. (Eng.) Chen, M. (Natl. Inst. Allergy and Infectious Diseases, Natl. Insts. Health, Bethesda, MD 20014); Lebowitz, J.; Salzman, N. P. *J Virol* 18(1): 211-217; 1976.

Superhelical simian virus 40 DNA I was reacted with N-cyclohexyl-N'-β-(4-methylmorpholinium)ethylcarbodiimide (CMC), and the location of CMC sites was mapped by use of the *Hin* D restriction endonuclease. The use of ^{14}C-labeled CMC allows a quantitative analysis of the binding to the respective *Hin* D restriction endonuclease fragments. The percentage of reactivity was 6.54% for fragment A, 3.87% for fragment B, and 2.74% for fragment G. No CMC radioactivity was detected in other fragments. This reactivity is in agreement with the evaluation of binding by buoyant density measurements. The above fragments also contain the sites susceptible to S_1 endonuclease action. This adds further support to the view that superhelical DNA can contain regions of localized interrupted secondary structure that may be capable of forming intrastrand hairpin structures if sequence relationships are favorable. This would present easily recognizable sites for RNA polymerase to bind as well as promote favorable energetics for binding.

0788 CHEMICAL MODIFICATION OF SIMIAN VIRUS 40 DNA BY REACTION WITH A WATER-SOLUBLE CARBODIIMIDE. (Eng.) Lebowitz, J. (Dept. Microbiology and Comprehensive Cancer Center, Univ. Alabama in Birmingham, Birmingham, AL 35294); Garon, C. G.; Chen, M. C. Y.; Salzman, N. P. *J Virol* 18(1): 205-210; 1976.

Superhelical simian virus 40 (SV40) DNA I was modified with N-cyclohexyl-N-β-(4-methylmorpholinium)ethylcarbodiimide (CMC). The reaction produced an increase in the sedimentation velocity of DNA I from 21S to 22.5S and a decrease in its buoyant density in CsCl from 1.694 to 1.688. The sedimentation velocity increased because of disruption of the hairpin sites that produced coil regions that increased the flexibility of the DNA. A comparable shift in buoyant density was observed in a saturated ethidium bromide-cesium chloride gradient where form II, which had been exposed to CMC, showed no shift. The CsCl-buoyant density data permitted an estimate that 108 molecules of CMC were bound per molecule of SV40 DNA I.

0789 INTEGRATED SIMIAN VIRUS 40 SEQUENCES IN TRANSFORMED CELL DNA: ANALYSIS USING RESTRICTION ENDONUCLEASES. (Eng.) Ketner, G. (Johns Hopkins Univ., Sch. Medicine, Baltimore, MD 21205); Kelly, T. J., Jr. *Proc Natl Acad Sci USA* 73(4): 1102-1106; 1976.

The DNAs from five independent simian virus 40 (SV40) transformants of the BALB/c 3T3 mouse cell line were digested with either the HpaII or the BamHI restriction endonuclease, and the resulting fragments were fractionated by gel electrophoresis. The DNA fragments were denatured in situ in the gel and transferred to a membrane filter. Fragments containing viral DNA were detected by hybridization with high specific activity ^{32}P-labeled SV40 complementary RNA (cRNA) synthesized in vitro. Each of the lines yielded a small number of fragments containing SV40 DNA. The pattern of the fragments from each line was different. This finding indicated that the structure of the integrated SV40 DNA and/or its location in the host DNA are different in each line.

0790 VARIABLE RESPONSE OF NORMAL AND TRANSFORMED MOUSE CELLS TO INTERFERON INDUCERS. (Eng.) Treagan, L. (Dept. Biology, Univ. San Francisco, San Francisco, CA 94117); Jayne, A.; Prato, C. *Acta Virol* 20(1): 83-85; 1976.

The interferon response of cloned simian virus-transformed and normal (BALB/3T3) mouse cells were compared by use of double-stranded (polyinosinic-polycytidylic acid and Colorado tick fever virus) and single-stranded RNA interferon inducers (Newcastle disease and influenza viruses). Induction with Newcastle disease virus produced high interferon titers in both the normal and transformed cells. Influenza virus also caused induction in both lines. The double stranded inducers both had little or no effect on the transformed cells, but induced 2.2-3.4 $\log_{10}$ U interferon in the normal cells. It is concluded that the ability of transformed cells to produce interferon is strongly affected by the nature of the inducer.

0791 PROTEIN-SV40 DNA COMPLEX STABLE IN HIGH SALT AND SODIUM DODECYL SULFATE. (Eng.) Kasamatsu, H. (Div. Chemistry and Chemical Engineering, California Inst. Technology, Pasadena, CA 91125); Wu, M. *Biochem Biophys Res Commun* 68(3): 927-936; 1976.

A protein-DNA complex that is stable in concentrated salt solutions and in the presence of sodium dodecyl sulfate was extracted from purified viruses and found in the nicked circular DNA fraction. The protein was visualized as a ''dot'' on the DNA molecule by electron microscopy, by a modified version of the ethidium bromide mounting technique. The position of the dot is at 0.67 genome unit clockwise from the *Eco*RI restriction site on the SV40 DNA map. The present hypothesis suggests that a complex of proteins exists at the origin of DNA replication: one of these possesses endonuclease activity, and one is tightly associated with the DNA.

0792 THE TRANSFORMATION BY SIMIAN VIRUS 40 OF CELLS FROM PATIENTS WITH MUCOPOLYSACCHARIDOSIS AND FROM NORMAL CONTROLS. (Eng.) Webb, T. (Medical Sch., Univ. Birmingham, Birmingham B15 2TJ, England); Harnden, D. G. *Cancer Res* 36(2): 298-301; 1976.

Fibroblasts derived from six children with mucopolysaccharidosis had a mean transformation rate of 4.6 foci/dish; the value from normal children was 1.6 ($p < 0.05$). Simian virus 40 was the transforming agent. Transformation rates of fibroblasts from patients with Morquio's syndrome, ataxia telangiectasia, Gaucher's disease, or GMI gangliosidosis were within the normal range. A case of cystic fibrosis and one of three obligatory heterozygotes had above-normal rates. A six-fold increase in rate occurred when cells were passaged more than 25 times, compared to those in passage 4. The increased susceptibility does not seem to depend upon changes in glycoprotein at the cell surface. Repeated observations were necessary to demonstrate these differences; this test is considered unsuitable for routine screening for cancer susceptibility.

0793 ENHANCED SV40-VIRUS REPLICATION IN CHINESE HAMSTER KIDNEY CELLS PRETREATED WITH 5-IODO-2'-DEOXYURIDINE. (Eng.) Suarez, H. G. (Institut de Recherches Scientifiques sur le Cancer, Villejuif, France); Morris, A. G.; Lavialle, Ch.; Cassingena, R. *Arch Virol* 50(3): 249-253; 1976.

SV40 virion production was enhanced when semipermissive Chinese hamster kidney cells were treated with 5-iodo-2'-deoxyuridine prior to infection with either virus or viral-DNA. Pretreatment did not increase SV40 replication in fully permissive monkey kidney and nonpermissive Syrian hamster or mouse embryo cells. It is not known whether the enhancing effect of the drug is limited to semipermissive cells, or whether the viral phenomenon is general for all viruses.

0794 THE EFFECTS OF SERUM CONCENTRATION ON THE LEVEL OF INTEGRATION OF SIMIAN VIRUS (SV40) GENOME AND THE TRANSFORMATION FREQUENCY IN SV40-INFECTED CHINESE HAMSTER CELLS. (Eng.) Hirai, K. (New York Univ. Medical Center, 550 First Ave., New York, NY 10016); Defendi, V. *Virology* 69(1): 229-236; 1976.

Chinese hamster embryo cultures were treated with different serum concentrations during the first 48 hr after simian virus 40 (SV40) infection. The treatment modified the proportion of cells in DNA synthesis, the amount of SV40-DNA integrated, the proportion of cellular DNA with 5-bromodeoxyuridine substitution in both strands, the proportion of polyploid cells, and the transformation frequency. All these parameters increased in a coordinated way as function of the serum concentration. It is suggested that the increase in the number of cells recruited into DNA synthesis facilitates the integration of viral DNA with an increased probability of transformation.

0795 INCREASED ENDONUCLEASE ACTIVITY IN AN EXTRACT FROM MOUSE EHRLICH ASCITES TUMOR CELLS WHICH HAD BEEN TREATED WITH A PARTIALLY PURIFIED INTERFERON PREPARATION: DEPENDENCE ON DOUBLE-STRANDED RNA. (Eng.) Brown, G. E. (Dept. Molecular Biophysics and Biochemistry, Yale Univ., New Haven, CT 6520); Lebleu, B.; Kawakita, M.; Shaila, S.; Sen, G. C.; Lengyel, P. *Biochem Biophys Res Commun* 69(1): 114-122; 1976.

Reovirus messenger RNAs are degraded faster in crude extracts (S30) from mouse Ehrlich ascites tumor cells which have been treated with either a partially purified interferon preparation or the interferon inducer poly(I)·poly(C) than in corresponding extracts from untreated cells. The faster degradation appears to be a consequence of endonuclease action. The endonuclease activity in vitro depends on the presence of double-stranded reovirus

RNA in the reaction mixture. The results suggest a novel way in which double stranded RNA might be involved in mediating the function of an interferon system.

0796 BIDIRECTIONAL REPLICATION OF ADENOVIRUS TYPE 2 DNA. (Eng.) Horwitz, M. S. (Albert Einstein Coll. Medicine, Bronx, NY 10461). *J Virol* 18(1): 307-315; 1976.

After short periods of labeling with ^{3}H-thymidine, recently completed adenovirus DNA molecules were isolated and cleaved with restriction endonucleases. The strands (heavy and light) of most of the restriction endonuclease fragments were separated. The pattern of labeling clearly shows an asymmetry of radioactivity on the isolated strands of each restriction endonuclease piece. The data are consistent with replication proceeding in the 5' to 3' direction on each strand. Thus, there is an initiation point placed at or near each end of the molecule. This model is similar to that reported for mitochondrial DNA replication. Further similarity exists in the resistance of both to inhibitors of protein synthesis.

0797 EFFECTS OF ARGININE STARVATION ON MACROMOLECULAR SYNTHESIS IN INFECTION WITH TYPE 2 ADENOVIRUS: III. IMMUNOFLUORESCENCE STUDIES OF THE SYNTHESIS OF THE HEXON AND THE MAJOR VIRAL CORE ANTIGEN (AAP). (Eng.) Prage, L. V. (Rutgers Medical Sch., Coll. Medicine and Dentistry New Jersey, Piscataway, NJ 08854); Rouse, H. *Virology* 69(1): 352-356; 1976.

The effects of arginine starvation on the appearance and accumulation of the adenovirus type 2 hexon antigen and the arginine-alanine-rich virus core protein (AAP) antigen were studied after infection (adenovirus Ad2) by immunofluorescence techniques. Both antigens were detected in arginine-deprived human embryonic kidney cells, although in decreased amounts as compared with cells infected in complete medium. The hexon antigen was decreased 75% by arginine-deficiency, compared to 30% for the AAP antigen, up to 28 hr after infection. Neither the hexon nor the AAP antigen was demonstrable in the presence of cytosine arabinoside (20 μg/ml). The mature AAP antigen, as detected serologically, may be considered a late viral protein.

0798 STUDIES ON THE ISOLATION OF CELL ASSOCIATED EPSTEIN BARR VIRUS ANTIGENS BY AFFINITY CHROMATOGRAPHY. (Eng.) Ng, M. H.; Ng, W. S.; Kwan, H. C. In: *Oncogenesis and Herpesviruses II. Part 1: Biochemistry of Viral Replication and In Vitro Transformation. Proceedings of a Symposium held in Nuremberg, Federal Republic of Germany, 14-16 October 1974.* International Agency for Research on Cancer, Lyon, France: IARC Scientific Publications No. 11, pt. 1, pp. 277-283; 1975.

Affinity chromatography was used to separate Epstein-Barr virus (EBV) antigens. Cell extracts from the producer cultures HKLy28 and P3HR-1, the nonproducer culture Raji, and the EBV-negative culture Molt, were used. EBV nuclear antigens and EBV capsid antigens from extracts of the two producer lines, and EBV nuclear antigens from the Raji extract, could be isolated with a considerable degree of purification. Early antigens were not detected.

0799 EBV-DETERMINED NUCLEAR ANTIGEN (EBNA)-POSITIVE CELLS IN THE PERIPHERAL BLOOD OF INFECTIOUS MONONUCLEOSIS PATIENTS. (Eng.) Klein, G. (Dept. Tumor Biology, Karolinska Inst., S-104 01 Stockholm 60, Sweden); Svedmyr, E.; Jondal, M.; Persson, P. O. *Int J Cancer* 17(1): 21-26; 1976.

The presence of Epstein-Barr virus-determined nuclear antigen (EBNA) positive cells in the peripheral B-blasts of acute infectious mononucleosis (IM) patients was investigated. After removal of SRBC rosette-forming T-cells from the peripheral blood, the residual, largely B-lymphocyte fraction of five patients was found to contain 0.5-2% blast cells, positive for the EBNA. There was a rough parallelism between the presence of large lymphoblasts in the hematological smear, EBNA-positive large blasts in the B-cell fraction, and the ability of the T-cell fraction to exert an Epstein-Barr virus (EBV)-specific lymphocytotoxicity on established cell lines in vitro. EBNA-positive B-cells and EBV-specific killer T-cells disappeared after the acute phase of the disease. The results demonstrate that there is no fundamental difference between the expression of the viral genome in IM blood and in established, EBV-carrying lines.

0800 COMPARISON BETWEEN TWO ANTIBODY POPULATIONS IN THE EBV SYSTEM: ANTI-MA VERSUS NEUTRALIZING ANTIBODY ACTIVITY. (Eng.) De Schryver, A. (Inst. Tumor Biology, Karolinska Inst., S-104 01, Stockholm, Sweden); Rosen, A.; Gunven, P.; Klein, G. *Int J Cancer* 17(1): 8-13; 1976.

Epstein-Barr virus-neutralizing antibody titers were determined in 11 sera from African Burkitt lymphoma or nasopharyngeal carcinoma patients and in the corresponding serum fractions retained above ultrafiltration membranes after low pH treatment, and after recombination of the retained and passed fractions by neutralization of the acidified samples. They were compared with the corresponding antimembrane antigen (MA) titers in seven of the same sera. While all sera tested showed substantial increase of the anti-MA activity in the retained fraction, resulting in a significantly increased mean titer, Epstein-Barr virus neutralizing activity did not change at all after identical treatment or changed only in a random fashion, resulting in stable mean titers. It is suggested that anti-MA and neutralizing antibodies are directed against at least partly different antigens on the virus.

0801 EPSTEIN-BARR VIRUS-SPECIFIC IGA SERUM ANTIBODIES AS AN OUTSTANDING FEATURE OF NASOPHARYNGEAL CARCINOMA. (Eng.) Henle, G. (Children's Hosp. of Philadelphia and Sch. of Medicine, Univ. Pennsylvania, Philadelphia, PA); Henle, W. *Int J Cancer* 17(1): 1-7; 1976.

A total of 372 sera from patients with nasopharyngeal carcinoma (NPC), other carcinomas, Burkitt's lymphoma (BL), infectious mononucleosis (IM) or healthy controls was tested for elevated immunoglobulin (Ig)A levels. The sera were titrated in indirect immunofluorescence tests for IgA antibodies to Epstein-Barr virus (EBV) capsid antigen (VCA) and to the diffuse (D) or restricted (R) components of the EBV-induced early antigen (EA) complex. The results proved NPC to be outstanding in that prior to therapy 93% of the patients tested revealed IgA antibodies to VCA and 73% to D, often at high titers which occasionally matched the corresponding IgG antibody levels. The EBV-specific IgA titers increased with the total tumor burden. Conversely, many of the NPC patients examined 2-6 yr after initial therapy had only low levels of EBV-specific IgA or none at all, and the majority of those with high titers was known to have residual or recurrent disease. In contrast to untreated NPC patients, less than 5% of 73 patients with other carcinomas or of 76 healthy donors revealed VCA-specific IgA and even fewer EA specific IgA; only 28% and 4% of 54 BL patients tested at admission had IgA antibodies to VCA and R, respectively, and 38% and 3% of 37 IM patients showed transient VCA- or D-specific IgA responses, all at generally low titers. It appears that the elevated IgA levels in NPC might be due to EBV-specific antibodies.

0802 EFFECT OF THE HOST CELL ON THE MAINTENANCE AND REPLICATION OF EPSTEIN-BARR VIRUS. (Eng.) Glaser, R. (Milton S. Hershey Medical Center, Pennsylvania State Univ., Hershey, PA 17033); Farrugia, R.; Brown, N. *Virology* 69(1): 132-142; 1976.

The role of the host cell in the expression of the Epstein-Barr virus (EBV) was studied with Burkitt somatic cell hybrids of human and mouse cells. Mouse/Burkitt somatic-cell hybrids contained a repressed EBV genome that was inducible with iododeoxyuridine. Electron microscopic examination of human/Burkitt hybrid epithelioid cells (D98/HR-1 and D98/Raji) and Burkitt lymphoblastoid cells in which EBV was replicating showed an enhancement of virus replication concomitant with an enhancement of EBV-specific cytopathologic effect in D98/HR-1 and D98/Raji cells compared to Burkitt lymphoblastoid cells. The EBV genome in hybrids of the nonproducer Burkitt cells (Raji) was less stable over time than hybrid cells of producer cells (HR 1). The cell in which the EBV genome resides plays a major role in the maintenance, expression, and replication of EBV.

0803 INHIBITION OF EPSTEIN-BARR VIRUS DNA SYNTHESIS AND LATE GENE EXPRESSION BY PHOSPHONOACETIC ACID. (Eng.) Summers, W. C. (Dept. Therapeutic Radiology, Yale Univ., New Haven, CT 06510); Klein, G. *J Virol* 18(1): 151-155; 1976.

Phosphonoacetic acid (PAA), shown recently to be a specific inhibitor of DNA polymerase that is active against several herpesviruses but inactive against mammalian cells, was used to test the hypothesis that the Epstein-Barr virus (EBV) viral capsid antigen (VCA) depends on viral DNA synthesis and not on host DNA synthesis. The authors used two cell lines: B95-8, a marmoset cell line derived by treatment with EBV from a human line (patient with acute infectious mononucleosis, and Ragi). Growth of lymphoblastoid cells (B95-8, Raji) was not inhibited by the presence of 0.4 mM PAA. The synthesis of EBV in the producer line B95-8 was completely inhibited, as shown by the total inhibition of VCA synthesis. Early viral antigens were made normally in the presence of PAA, but EBV DNA synthesis was blocked in cells entering the productive cycle. Nonproducer cells in the population replicated the resident EBV DNA by a mechanism that was resistant to PAA. These results are consistent with the hypotheses that EBV DNA is replicated by two mechanisms, one in the noninduced cell and a different mechanism in the producer cell, and that prior replication of EBV DNA, probably by the second mode, is a prerequisite for late gene expression. Also, EBV is similar to other herpesviruses in its sensitivity to PAA, late gene expression is somehow dependent upon prior synthesis of DNA, and repressed viral genomes in nonproducer cells are under cellular rather than viral control.

0804 COMPARATIVE STUDIES OF EPSTEIN-BARR VIRUS STRAINS FROM GHANA AND THE UNITED STATES. (Eng.) Gerber, P. (Dept. Health, Education, and Welfare, Public Health Service, Food and Drug Admin., 8800 Rockville Pike, Bethesda, MD 20014); Nkrumah, F. K.; Pritchett, R.; Kieff, E. *Int J Cancer* 17(1): 71-81; 1976.

The incidence of oral excretion of Epstein-Barr virus (EBV) in infectious mononucleosis (IM) and Burkitt lymphoma (BL) patients was compared to that of asymptomatic controls and the virus excretion was correlated with clinical and serological data. Other objectives included: an examination of the antigenic relationships among EBV isolates by cross-neutralization tests, a comparison of virus expression in lymphocytes transformed in vitro by various EBV isolates, and determination of the degree of relatedness of EBV isolates as a reference EBV DNA by nucleic acid hybridization. A high incidence of oropharyngeal excretion of EBV was observed in African children with BL (48%) and matched controls (45%). This compares with an incidence of 77% in American patients with IM and 13% in age-matched controls. Cross-neutralization tests between EBV strains derived form BL and IM patients and their sera failed to detect differences in the major neutralizing antigenic components. Cord-blood lymphocytes transformed by American EBV expressed only early viral functions (EBV nuclear and soluble complement-fixing antigens) and produced no detectable transforming activity. By contrast, cord-blood lymphocytes transformed by African EBV strains contained 0.2-0.3% of cells with EBV capsid and early antigen and produced EBV with transforming activity. These cells contained twice as many copies of EBV homologous DNA as the cells transformed by American EBV strains. The results suggest that EBV from Africa and from America differ in the extent of permissiveness in lymphoid cells.

0805 ASSOCIATION OF HERPES SIMPLEX VIRUS TYPE 1 DNA WITH HOST CHROMOSOMAL DNA DURING PRODUCTIVE INFECTION. (Eng.) Biegeleisen, K. (New York Univ. Sch. Medicine, 550 First Ave., New York, NY 10016); Rush, M. G. *Virology* 69(1): 246-257; 1976.

Reassociation kinetics were used to study herpes simplex virus type 1 (HSV-1) DNA in the total DNA isolated from productively infected African green monkey kidney (BSC-1) cells. Cesium chloride equilibrium density gradient centrifugation of total DNA from infected cells gave distinct peaks of viral and host cell nucleic acids. Reassociation kinetics revealed viral sequences in the host peak. Host cell DNA further purified by repeated CsCl density gradient centrifugations also contained viral sequences. Contamination of this purified material with viral DNA accounted for very few of these sequences, and buoyant-density heterogeneity of fragmented HSV-1 DNA is integrated into host chromosomal DNA during productive infection. A repetitive sequence of productive and lysogenic interactions could result in latent-recurrent herpes infections.

0806 BIOCHEMICAL AND SEROLOGICAL PROPERTIES OF THE THYMIDINE-PHOSPHORYLATING ENZYMES INDUCED BY HERPES SIMPLEX VIRUS MUTANTS TEMPERATURE-DEPENDENT FOR ENZYME FORMATION. (Eng.) Kit, S. (Baylor Coll. Medicine, Houston, TX 77025); Jorgensen, G. N.; Dubbs, D. R.; Chan, S.-K.; Leung, W.-C. *Virology* 69(1): 179-190; 1976.

Evidence is presented which suggests that: an enzyme induced by wild-type herpes simplex virus type 1 (HSV-1) is a deoxypyrimidine kinase with a single active site for the phosphorylation of thymidine (TdR) and deoxycytidine (CdR); enzymes induced by HSV-1 mutants that are temperature dependent for enzyme induction have altered nucleoside acceptor specificity and antigenicity; and altered polypeptides are synthesized in mutant-virus-infected (LM(TK-) mouse) cells at both the permissive (31 C) and restrictive (37.5 C) temperatures. HSV-1 mutants B2010 and B2015 induced less TdR-phosphorylating activities at 31 C than wild-type HSV-1 and very low enzyme activities at 37.5 C. The TdR-phosphorylating activities induced by the mutant viruses at 31 C had the same electrophoretic mobilities as that of the wild-type HSV-1 induced enzyme but lacked CdR-phosphorylating activity. Immunoglobulin G (IgG) prepared from rabbits immunized with cytosol extracts from rabbit kidney cells infected with wild-type HSV-1 inhibited the TdR-phosphorylating activities induced by wild-type HSV-1. Extracts purified from cells infected at 31 C with wild-type and mutant HSV-1 blocked the neutralizing activity of anti-HSV-1 IgG for the CdR- as well as the TdR-phosphorylating activities of wild-type HSV 1 enzyme. The mutant virus-infected cell extracts were less effective than wild-type extracts in serum blocking activity. Extracts from cells infected with mutant B2015 at 37.5 C did not exhibit serum blocking power.

0807 SEROLOGICAL SPECIFICITY OF THYMIDINE KINASE ACTIVITY IN HERPES SIMPLEX VIRUS-TRANSFORMED L CELLS. (Eng.) Thouless, M. E. (Medical Sch., Univ. Birmingham, B152TJ, England); Chadha, K. C.; Munyon, W. H. *Virology* 69(1): 350-351; 1976.

Thymidine kinase (TK) activities of L cells transformed by herpes simplex virus type 1 (HSV-1) or type 2 (HSV-2) were neutralized type-specifically by antisera from rabbits immunized with these viruses. The TK activities of L cells transformed by HSV-1 or by HSV-2 were serologically similar to those induced by viruses in lytically infected baby hamster kidney cells, suggesting that the TK activity in HSV-transformed L cells is virus coded.

0808 INHIBITION OF HERPESVIRUS DEOXYRIBONUCLEIC ACID AND PROTEIN SYNTHESIS BY TILORONE HYDROCHLORIDE. (Eng.) Katz, E. (Hebrew Univ.-Hadassah Medical Sch. Jerusalem, Israel); Margalith, E.; Winer, B. *Antimicrob Agents Chemother* 9(1): 189-195; 1976.

Tilorone hydrochloride at a concentration of 10 μg/ml very efficiently inhibited herpes simplex virus growth in BSC1 cells at a low multiplicity of infection (one plaque-forming unit/3 x 10^4 cells and two plaque-forming units of ^{3}H-virus/3 x 10^4 cells). The adsorption of the virus was not affected by the drug, and the penetration of the DNA of the input virus into the cytoplasm and nuclei proceeded normally when tilorone hydrochloride was present. However, newly synthesized viral DNA was not detectable under these conditions, there was a remarkable decrease in the rate of viral polypeptide synthesis, and virus particles were not formed. The inhibition of herpesvirus growth by tilorone hydrochloride was absolutely dependent on the presence of the drug in the cultures. Pretreatment of the cells with the drug did not result in resistance to herpesvirus infection after the removal of the drug. The results show that in the presence of the drug, adsorption and penetration of viral DNA into the cytoplasm and nuclei of the cells takes place normally, but synthesis of viral DNA is completely inhibited.

0809 DEFICIENCY IN HISTONE ACETYLATION IN NONTRANSFORMING HOST RANGE MUTANTS OF POLYOMA VIRUS. (Eng.) Schaffhausen, B. S. (Harvard Medical Sch., Boston, MA 02115); Benjamin, T. L. *Proc Natl Acad Sci USA* 73(4): 1092-1096; 1976.

The histone acetylation of wild-type polyoma and simian virus 40 particles, and of nontransforming host range mutants of polyoma virus, was studied by polyacrylamide gel electrophoresis. Histones H3 and H4, derived from transforming wild-type polyoma and simian virus 40 particles were found to show extensive acetylation compared to the histones of the host cells. The same histone fractions derived from nontransforming host range mutants of polyoma virus failed to show this high degree of acetylation.

0810 HUMAN PAPILLOMA VIRUS DNA: PHYSICAL MAPPING AND GENETIC HETEROGENEITY. (Eng.) Gissmann, L. (Institut fur Klinische Virologie der Universitat Erlangen-Nurnberg, Loschgestr. 7, 852 Erlangen, W. Germany); zur Hausen, H. *Proc Natl Acad Sci USA* 73(4): 1310-1313; 1976.

The restriction endonuclease cleavage pattern of three papilloma viruses isolated from plantar warts was analyzed. The molecular weight of human papilloma virus DNA derived was determined by agarose gel electrophoresis or electron microscopic contour length measurement. It was found to be approximately 4.9 x 10^6. Analysis of this DNA after sequential digestion by four different restriction endonucleases (EcoRI, Bam, Hind II, and Hind III) permitted physical mapping of the cleavage sites. Two of the three DNA preparations revealed an identical cleavage pattern, whereas the third contained two additional cleavage sites. The data indicate genetic heterogeneity even within papilloma viruses purified from histological similar epithelial proliferations.

0811 ISOLATION AND CHARACTERIZATION OF POLY(A)-CONTAINING POLYOMA ''EARLY'' AND ''LATE'' MESSENGER RNAS. (Eng.) Rosenthal, L. J. (Sch. Medicine and Dentistry, Georgetown Univ., Washington, DC 20007). *Nucleic Acids Res* 3(3): 661-676; 1976.

During late lytic infection of mouse kidney cell cultures, polyoma 16S and 19S (late 19S RNA) were isolated by oligo(dT)-cellulose chromatography. Approximately 60-80% of total cytoplasmic polyoma RNA contained tracts of polyadenylate (poly(A)), which were retained by oligo(dT)-cellulose. Early in lytic infection, when viral DNA synthesis and the production of capsid protein are blocked by the addition of 5-fluorodeoxyuridine, approximately 100% of polyoma ''early'' 19S RNA was quantitatively retained by oligo(dT)-cellulose, indicating the presence of poly(A) tracts on most 19S mRNA molecules. In addition, two classes of polyoma RNA, synthesized after the onset of cellular RNA synthesis under conditions in which DNA synthesis is inhibited with 5-fluorodeoxyuridine, were found to contain tracts of poly(A). These species, sedimenting at 16S and 19S in aqueous sucrose density gradients, were also quantitatively retained by oligo(dT)-cellulose. These results show that all presently known classes of Py mRNAs can be isolated by oligo(dT)-cellulose chromatography.

0812 TRANSPLACENTAL TRANSMISSION OF BK VIRUS IN HUMAN. (Eng.) Taguchi, F. (Kitasato Univ. Sch. Hygienic Sciences, Asamizodai, Sagamihara-shi, Kanagawa 228, Japan); Nagaki, D.; Mitsuji, S.; Haruyama, C.; Iwasaki, K.; Suzuki, T. *Jpn J Microbiol* 19(5): 395-398; 1975.

Experiments were designed to determine (a) the prevalence and distribution of BK virus antibody in women during pregnancy, and (b) the occurrence, if any, of transplacental transmission of BK virus. A significant level of hemagglutination-inhibition (HI) antibody to BK virus was found in over 70% of sera from groups of 63 healthy nonpregnant women, 71 women who experienced spontaneous abortion, and 80 pregnant women. When sera were tested from the 80 mothers sampled in early pregnancy and after delivery, six women showed a 4-fold or greater HI antibody seroconversion to BK virus. In this group, 2-mercaptoethanol (2-ME)-sensitive antibody was detected in 3 of 6 umbilical cord samples. None of the umbilical cord blood samples from those without seroconversion had 2-ME-sensitive antibody, indicating that virus infection can be transplacentally transmitted. BK virus infections, as evidenced by 2-ME-sensitive antibody, were also recognized in six women who aborted, in four women in the first trimester of pregnancy, and in two samples collected after delivery. 2-ME-sensitive antibody was not found in any samples from nonpregnant women. HI titers to BK virus were detected in both IgM and IgG Sephadex G-200-separated fractions from the umbilical cord blood. Only IgM HI antibody against BK virus was eliminated by 2-ME treatment. The data indicate that BK virus is a relatively common infecting agent during pregnancy. The authors suggest that BK virus may persist in a latent form in a certain proportion of healthy women and become activated during pregnancy.

0813 VIRAL "TUMORIGENESIS" IN MAN: CELL MARKERS IN *CONDYLOMATA ACUMINATA*. (Eng.) Friedman, J. M. (Veterans Admin. Hosp., Seattle, WA 98108); Fialkow, P. J. *Int J Cancer* 17(1): 57-61; 1976.

Determination of the glucose-6-phosphate dehydrogenase (G-6-PD) phenotype of a neoplasm occurring in a heterozygous female was used to trace the cellular origin of the tumor. This technique was performed on 834 individual verrucous subunits from four *condylomata acuminata* (venereal warts) arising in two patients heterozygous for a B and an A gene at the G-6-PD locus. All four specimens contained both A and B types of G-6-PD. Furthermore, even single verrucous subunits from each specimen occasionally contained both enzyme types. These data indicate that *condylomata acuminata* have a multicellular origin. The initial number of cells which, after viral infection, developed into a *condyloma acuminatum* was estimated to be about 4,400 cells, on the basis of statistical analysis of the data in one case.

0814 AN RNA-DEPENDENT RNA POLYMERASE FROM GALL TISUE OF FIJI DISEASE-INFECTED SUGARCANE LEAVES. (Eng.) Ikegami, M. (Waite Agricultural Res. Inst., Univ. Adelaide, South Australia); Francki, R. I. B. *Ann Microbiol* 127 A(1): 117; 1976.

The properties of Fiji disease virus (FDV) were studied. It had polyhedral particles about 70 nm in diameter containing 9 or 10 double-stranded RNA segments ranging in molecular wt from 1.08 x 10^6 to 2.60 x 10^6 daltons. The virus could be transmitted by three leafhopper species of the genus *Perkinsiella* to sugarcane, other *Saccharum* spp., *Zea mays* and *Sorghum* spp. Infected plants developed characteristic galls along the veins on the lower surfaces of the leaves and leaf sheaths, to which the virus particles appeared to be largely confined. RNA-dependent RNA polymerase activity was detected in concentrated extracts of gall tissue from FDV-infected sugarcane leaves but not in similar extracts from healthy leaf tissue. Optimal enzyme activity occurred at about 35 C, at pH 8.5-9.0 and in the presence of 8 mM $MgCl_2$ and 200 mM NH_4Cl. The product of the polymerase activity was single-stranded RNA, over 80% of which annealed to FDV RNA. Distribution of the polymerase in centrifugal fractions was correlated with the distribution of FDV antigen, suggesting that the enzyme was virion associated. Some polymerase activity was also detected in preparations of sub-viral particles purified from gall tissue extracts. The mode of FDV replication in sugarcane cells may be very similar to that of other *Reoviridae* infecting mammalian cells although the latter do not become tumorogenic. FDV can also replicate in tissues of its insect vector without the formation of tumors.

0815 CHARACTERISATION OF A VIRUS (HL23V) ISOLATED FROM CULTURED ACUTE MYELOGENOUS LEUKAEMIC CELLS. (Eng.) Chan, E. (Inst. Cancer Res., Columbia Univ., 99 Fort Washington Ave., New York, NY 10032); Peters, W. P.; Sweet, R. W.; Ohno, T.; Kufe, D. W.; Spiegelman, S.; Gallo, R. C.; Gallagher, R. E. *Nature* 260(5548): 266-268; 1976.

The HL23V virus, grown in A204 human rhabdomyosarcoma cell culture, was characterized by molecular hybridizations with RNA found in the particles released into the supernatant and by tests for immunological similarity to the major structural antigens of simian sarcoma virus, type 1 (SSV-1) and of baboon endogenous virus (BV-M7). Antisera prepared against the SSV-1 reverse transcriptase was capable of inactivating the reverse transcriptase activity of HL23V particles to only about 60%, suggesting the presence of a second virus containing an antigenically unrelated enzyme. Hydroxyapatite temperature gradient elution profiles of viral complementary DNAs (cDNA) prepared from SSV and BV-M7 annealed to total RNA from HL23V particles showed that the HL23V particles contain the complete information of both SSV and BV-M7. HL23V cDNA hybridized 37 and 44% to the BV-M7 and SSV-1, respectively. These individual hybridizations were additive as demonstrated by the complete complexing of HL23V cDNA to a mixture of BV-M7 and SSV 1 viral RNAs. These data indicate that the genetic information of HL23V virions is accounted for by these two viruses. Virus was concentrated by ultracentrifugation from culture supernatants of A204 (HL23V) and used as competing antigens in radioimmunoassays for the p30 and gp45 of SSV. The slope and extent of competition of HL23V in both assays were indistinguishable from SSV. Immunodiffusion analysis of HL23V with antisera prepared against p30 of SSV and p28 of the BV-M7 viruses demonstrated lines of identity with BV-M7 and SSV-1, indicating that HL23V is indistinguishable from a mixture of the two agents. The relationship of the HL23V particles to human leukemia is discussed.

0816 PRODUCTION OF UNIQUE C-TYPE VIRUSES BY CHICKEN CELLS GROWN IN BROMODEOXYURIDINE. (Eng.) Robinson, H. L. (Stanford Univ. Sch. Medicine, Stanford, CA 94305); Swanson, C. A.; Hruska, J. F.; Crittenden, L. B. *Virology* 69(1): 63-74; 1976.

Growth in bromodeoxyuridine (BrdU) increased the level of expression of endogenous avian C-type virus in certain 100 x 7 and line 15 chick embryo fibroblasts (CEF). The virus produced by BrdU treated 100 x 7 CEF is a subgroup E avian leukosis virus (ALV) with a more restricted host range than found for other subgroup E ALV's. The virus produced by BrdU-treated line 15 cells did not grow on cells which supported the growth of subgroups A, B, C, D, E ALV and appears to be either a new or defective avian C-type virus. The virus-like particles in medium from BrdU-treated C/BE or C/ABE 100 x 7 CEF are termed 100 x 7-induced leukosis virus (100 x 7-ILV). Interference tests showed 100 x 7-ILV to be a subgroup E ALV. Its failure to replicate in K28 chf-gs- C/O CEF implies an intracellular mechanism inhibiting its replication. CEF from nine commercial strains and one other inbred line of chickens did not produce avian C-type virus either before or after growth in BrdU.

0817 SPECIFIC BINDING OF THE TYPE C VIRAL CORE PROTEIN P12 WITH PURIFIED VIRAL RNA. (Eng.) Sen, A. (Natl. Inst. of Health, Bethesda, MD 20014); Sherr, C. J.; Todaro, G. J. *Cell* 7(1): 21-32; 1976.

The major viral phosphoproteins (p12) of the Rauscher murine leukemia virus (R-MuLV) and the simian sarcoma-associated virus (SSAV) bound in vitro to their homologous 70S and 35S viral RNAs. Using purified ^{32}P-RNA and ^{125}I-p12 protein, complexes stabilized by formaldehyde cross-linking could be readily detected after velocity gradient centrifugation. The in vitro reconstructed ribonucleoprotein complexes were seen only with p12 proteins incubated with viral RNAs isolated from the same type C viruses; no such complexes formed with heterologous protein-RNA mixtures. Homologous but not heterologous p12 molecules competed with labeled p12 protein for the specific viral RNA binding sites. The competition assay permitted the detection of 10 ng of viral p12 protein. The major internal protein of type C viruses (p30) did not bind to viral RNA in identical assay conditions. From the specific activities of the labeled components and also by equilibrium sedimentation analysis, it was estimated that fewer than 15 molecules of p12 protein bound to each molecule of viral RNA. The specificity and the stoichiometry of the p12-RNA interactions suggest that these RNA tumor virus proteins have a regulatory role in cells.

0818 IMMUNOLOGICAL AND BIOCHEMICAL CHARACTERISATION OF TYPE C VIRUSES ISOLATED FROM CULTURED HUMAN AML CELLS. (Eng.) Okabe, H. (Flow Lab., Inc., Rockville, MD 20852); Gilden, R. V.; Hatanaka, M.; Stephenson, J. R.; Gallagher, R. E.; Gallo, R. C.; Tronick, S. R.; Aaronson, S. A. *Nature* 260(5548): 264-266; 1976.

Immunological and molecular hybridization studies were used to investigate the relationship between acute myelogenous leukemia (AML) virus isolate (HL23V) to known type C viruses. The AML virus, propagated in either canine thymus or human cells, was initially found to contain proteins of both primate virus groups based on complement-fixation tests and radioimmunoassays that are specific for woolly monkey-gibbon virus p30 and RD114-baboon virus p30, respectively. The suggestions that two viruses were present and that these were indistinguishable from woolly monkey and baboon viruses were confirmed by detection of viral RNA using complementary ^{3}H-DNA prepared in the endogenous reverse transcriptase reaction, thermal stability criteria, and type-specific radioimmunoassays. Thus, the HL23V preparations contain two distinct viruses; one indistinguishable from the woolly monkey virus, and the second indistinguishable from an endogenous virus of the baboon species, *Papio cynocephalus*.

0819 RELATIONSHIPS BETWEEN INTRACISTERNAL TYPE A AND EXTRACELLULAR ONCORNAVIRUS-LIKE PARTICLES PRODUCED IN MURINE MOPC-460 MYELOMA CELLS. (Eng.) Robertson, D. L. (Dept. Biological Chemistry, Washington Univ., St. Louis, MO 63110); Yau, P.; Dobbertin, D. C.; Sweeney, T. K.; Thach, S. S.; Brendler, T.; Thach, R. E. *J Virol* 18(1): 344-355; 1976.

Oncornaviruslike particles of the A (both intracisternal and intracytoplasmic) and B or C (extracellular) types are produced by murine MOPC-460 myeloma cells. A comparative study of intracisternal A and extracellular particles is described. Both types of particles contained an RNA-dependent DNA polymerase activity, traces of 35S and 70S RNA in addition to larger amounts of degraded RNA, and proteins of approximately 76,000 and 45,000 daltons. The 76,000-dalton proteins from intracisternal A and extracellular particles had the same cyanogen bromide peptides. Hybridization kinetic analysis indicated that the RNA's in the two particles were identical or very closely related and shared partial homology with Moloney leukemia virus RNA. In contrast, the particles appeared to have little or no relationship to murine mammary tumor virus, as judged by several different criteria. Electron microscope studies indicated that the extracellular particles arose from the budding of core components through the plasma membrane, and preliminary experiments indicated that they contained the same proteins as the intracisternal A particles. These results suggest that the intracisternal A and extracellular oncornaviruslike particles produced by MOPC-460 cells are closely related.

0820 PROPERTIES OF MURINE INTRACISTERNAL A PARTICLES: ELECTRON MICROSCOPIC APPEARANCE AFTER CRITICAL POINT DRYING AND PLATINUM SHADOWING. (Eng.) Malech, H. L. (Natl. Cancer Inst., Natl. Inst. Health, Bethesda, MD 20014); Wivel, N. A. *Virology* 69(2): 802-809; 1976.

By combining critical point drying with uranyl acetate positive staining and platinum shadowing, it was possible to observe whole unsectioned intracisternal A particles (IAP) from plasma cell tumor MOPC-104E, while simultaneously demonstrating internal detail. IAP were seen to exist in the isolated state as budding and intact forms, and to consist of two concentric spherical shells surrounding a roughly spherical electron lucent core. The outer shell was sensitive to the detergent sodium deoxycholate, but the inner shell was resistant to this agent and retained its spherical construction following treatment with it. The inner shell was not solubilized by 1% sodium dodecyl sulfate, but it did lose its structural integrity, and collapsed. Exposure to 0.15% trypsin for limited time periods revealed concentric linear densities in the inner shell; such structures were faintly visible in untreated particles.

0821 EVIDENCE FOR CIRCULARIZATION OF THE AVIAN ONCORNAVIRUS RNA GENOME DURING PROVIRAL DNA SYNTHESIS FROM STUDIES OF REVERSE TRANSCRIPTION IN VITRO. (Eng.) Collett, M. S. (Univ. Minnesota Medical Sch., Minneapolis, MN 55455)1 Faras, A. J. *Proc Natl Acad Sci USA* 73(4): 1329-1332; 1976.

0822 TRANSLATION OF AVIAN MYELOBLASTOSIS VIRUS RNA IN A RETICULOCYTE CELL-FREE SYSTEM. (Eng.) Salden, M. H. L. (Dept. Biochemistry, Univ. Nijmegen, Geert Grooteplein Noord 21, Nijmegen, The Netherlands); Bloemendal, H. *Biochem Biophys Res Commun* 68(1): 249-255; 1976.

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0825 BRIEF COMMUNICATION: NATURALLY OCCURRING RETICULOENDOTHELIOSIS IN TURKEYS: TRANSMISSION. (Eng.) Paul, P. S. (Coll. Veterinary Medicine, Univ. Minnesota, St. Paul, MN 55108); Pomeroy, K. A.; Sarma, P. S.; Johnson, K. H.; Barnes, D. M.; Kumar, M. C.; Pomeroy, B. S. *J Natl Cancer Inst* 56(2): 419-422; 1976.

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0827 INTERFERON INDUCTION BY A TUMORAL DNA IN AN HOMOLOGOUS CULTURE SYSTEM. (Eng.) de Kohan, S. S. (Instituto de Oncologia, Av. San Martin 5481, Capital, Argentina); Teyssie, A. R.; de Pirosky, R. R.; Loria, D.; de Holstein, B. A. *Biomed Express (Paris)* 23(10): 419-422; 1975.

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0840 ERYTHROID CELL DIFFERENTIATION: MURINE ERYTHROLEUKEMIA CELL VARIANT WITH UNIQUE PATTERN OF INDUCTION BY POLAR COMPOUNDS. (Eng.) Ohta, Y. (Columbia Univ. Coll. Physicians and Surgeons, 630 W. 168th St., New York, NY 10032); Tanaka, M.; Terada, M.; Miller, O. J.; Bank, A.; Marks, P. A.; Rifkind, R. A. *Proc Natl Acad Sci USA* 73(4): 1232-1236; 1976.

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0869 HERPESVIRUS AND CERVICAL CANCER (Letter to Editor). (Eng.) Oates, J. K. (Westminster Hosp., London SW1, England). *Br Med J* 1(6014): 900; 1976.

0870 STUDIES ON THE IN VITRO UNCOATING OF POLIOVIRUS. I. CHARACTERIZATION OF THE MODIFYING FACTOR AND THE MODIFYING REACTION. (Eng.) De Sena, J. (Public Health Res. Inst. of The City of New York, Inc., New York, NY 10016); Mandel, B. *Virology* 70(2): 470-483; 1976.

0871 IODINATION OF DNA. STUDIES OF THE REACTION AND IODINATION OF PAPOVAVIRUS DNA. (Eng.) Anderson, D. M. (Univ. Michigan Sch. Medicine, Ann Arbor, MI 48104); Folk, W. R. *Biochemistry* 15(5): 1022-1030; 1976.

0872 CHARACTERIZATION OF CELL LINES DERIVED FROM HAMSTER TUMORS INDUCED WITH THE BK VIRUS. (Eng.) Sten, M. (Dept. Clinical Microbiology, Univ. Kuopio, P. O. B. 138, 70101 Kuopio 10, Finland); Tolonen, A.; Pitko, V. M.; Nevalainen, T.; Mantyjarvi*, R. A. *Arch Virol* 50(1/2): 73-82; 1976.

0873 A STUDY OF THE EFFECT OF THYROCALCITONIN AND THYMECTOMY ON THE PATTERN OF NEOPLASMS IN C3H/FG MICE (Abstract). (Eng.) Volz, J. E. (Univ. Maryland, College Park, MD). *Diss Abstr B* 36(8): 3854B; 1976.

0874 IMMUNITY TO C-TYPE RNA VIRUSES: ANTIBODY FORMATION AFTER NATURAL OR DELIBERATE INFECTION. (Eng.) Schwartz, R. S. (New England Medical Center Hosp., Boston, MA 02111); Donnelly, J.; Melief, C. J. M.; Louie, S. *J Immunol* 116(3): 657-659; 1976.

0875 BRIEF COMMUNICATION: HOST--RANGE PROPERTIES OF MURINE XENOTROPIC AND ECOTROPIC TYPE-C VIRUSES. (Eng.) Oie, H. K. (Natl. Cancer Inst., Bethesda, MD 20014); Russell, E. K.; Dotson, J. H.; Rhoads, J. M.; Gazdar, A. F. *J Natl Cancer Inst* 56(2): 423-426; 1976.

0876 GLYCOLIPID GLYCOSYL TRANSFERASES OF A HAMSTER CELL LINE IN CULTURE. II. SUBCELLULAR DISTRIBUTION AND THE EFFECT OF CULTURE AGE AND DENSITY. (Eng.) Chandrabose, K. A. (Imperial Cancer Res. Fund Lab., P.O. Box 123, Lincoln's Inn Fields, London WC2A 3PX, U.K.); Graham, J. M.; MacPherson, I. A. *Biochim Biophys Acta* 429(1): 112-122; 1976.

0877 RELEASE OF ACTIVE DNA BY CANCER CELLS. (Eng.) Valladares, Y. (Dept. Biology and Biochemistry Cancer, Instituto Nacional de Oncologia, Ciudad Universitaria, Madrid-3, Spain); Alvarez, Y.; Noves, J. A. *Rev Esp Oncol* 20:19-30; 1973.

0878 CHILDHOOD LYMPHATIC LEUKEMIA: PRENATAL SEASONALITY AND POSSIBLE ASSOCIATION WITH CONGENITAL VARICELLA. (Eng.) Vianna, N. J. (NY State Dept. Health, Albany, NY 12237); Polan, A. K. *Am J Epidemiol* 103(3): 321-332; 1976.

0879 ULTRASTRUCTURAL LOCALIZATION OF VIRAL ANTIGENS USING THE UNLABELED ANTIBODY-ENZYME METHOD. (Eng.) Wendelschafer-Crabb, G. (Univ. Minnesota Hosp., Minneapolis, MN 55455); Erlandsen, S. L.; Walker, D. H., Jr. *J Histochem Cytochem* 24(3): 517-526; 1976.

0880 DEPRESSION OF VIRAL INTERFERON INDUCTION IN CELL MONOLAYERS BY ASBESTOS FIBERS. (Eng.) Hahon, N. (ALFORD, Box 4292, Morgantown, WV 26505); Eckert, H. L. *Environ Res* 11(1): 52-65; 1976.

See also:

* (Rev): 0613, 0616, 0617
* (Phys): 0746
* (Immun): 0889, 0890, 0891, 0901, 0907, 091
0924, 0938, 0952, 0953, 0958, 096
0967
* (Path): 1054
* (Epid-Biom): 1098

0881 EXPERIMENTAL LUNG METASTASES AS A TEST IN TUMOUR IMMUNOLOGY. (Eng.) Silobrcic, V.; Milas, L.; Mujagic, H. In: *Host Environment Interactions in the Etiology of Cancer in Man. Proceedings of a Meeting Held at Primosten, Yugoslavia, 27 August--2 September 1972.* IARC Scientific Publications No. 7 and Fogarty International Center Proceedings No. 18. International Agency for Research on Cancer and John E. Fogarty International Center of the National Institutes of Health USA. (Lyon, France): 411-417; 1973.

Cells of a methylcholanthrene-induced fibrosarcoma of C57BL mice, injected iv into syngeneic hosts, produced visible tumor nodules on the surface of the recipient's lung. These metastases could be counted macroscopically. Their number was reduced in mice immunized against the specific antigens of the tumor, while it was comparable to control values in mice preimmunized against a CBA mammary carcinoma. Lymph-node cells from specifically sensitized mice, when mixed with tumor cells shortly before iv injection, could adoptively transfer immunity to untreated C57BL mice. Total-body x-irradiation (450 R) of recipients, prior to injection of tumor cells, significantly decreased the number of experimental pulmonary metastases. There were significantly fewer lung metastases in recipients splenectomized before the injection of tumor cells, as compared with sham splenectomized recipients. Lung metastases were found to permit better quantitation of the results than tumors produced by implantation of cells into subcutaneous sites.

0882 SUBVERSION OF HOST DEFENSE MECHANISMS BY MURINE TUMORS. I. A CIRCULATING FACTOR THAT SUPPRESSES MACROPHAGE-MEDIATED RESISTANCE TO INFECTION. (Eng.) North, R. J. (Trudeau Inst., Inc., Saranac Lake, NY 12983); Kirstein, D. P.; Tuttle, R. L. *J Exp Med* 143(3): 559-573; 1976.

The theory that malignant neoplasms are those neoplasms that are naturally selected to avoid detection by mononuclear phagocytes was tested. The sc injection of cells of any one of five unselected murine tumors (SA1 spindle cell sarcoma syngeneic in the A/J strain, the Meth A fibrosarcoma syngeneic in BALB/c, the P-815 mastocytoma and CaD_2 mammary carcinoma syngeneic in DBA/2, and the EL4 lymphoma syngeneic in C57BL/6) resulted very rapidly in the liberation into the circulation of a small molecular weight factor that severely impaired the capacity of the host to resist experimental infection with *Listeria monocytogenes* and *Yersinia enterocolitica*. The factor appeared in blood within eight hr of injection of tumor cells. That it possessed potent physiological activity was evidenced by the demonstration that an infusion of as little as 0.015 ml of tumor-bearer serum strikingly suppressed the capacity of normal recipients to resist bacterial infection. Because the only cells in mice with the capacity to destroy *Listeria* are macrophages, suppression of antibacterial resistance must be caused by the ability of the tumor-suppressor factor to interfere, either directly or indirectly, with the antibacterial functions of these mononuclear phagocytic cells. The results are consistent with the hypothesis that at least some malignant neoplastic cells are naturally selected to avoid destruction by native and acquired antitumor mechanisms of mononuclear phagocytes.

0883 MACROPHAGE PRECURSORS COUNTED IN THE BLOOD OF PATIENTS WITH CANCER WHO SHOW REDUCED DELAYED HYPERSENSITIVITY. (Eng.) Marshall, H. (Faculty Medicine, Memorial Univ. Newfoundland, Newfoundland, A1C 5S7, Canada); Scott, M.; Simmons, S.; Noel, P. *IRCS Med Sci: Cancer* 4(1): 40; 1976.

Macrophage precursors were counted in 14 anergic cancer patients, and skin tests for delayed hypersensitivity were performed. Nine cancer patients showed no measurable response to any of five antigens, whereas 14 controls gave a measurable response to one or more of the same antigens. The average number of macrophage precursors in the blood of the cancer patients ($267\ 804/mm^3$) was not different ($0.97 < p < 0.8$) from the controls ($280\ 425/mm^3$). The defect in macrophage mobilization onto skin windows in the cancer patients is therefore not due to shortage of bloodstream precursors.

0884 THE EFFECT OF CYCLOPHOSPHAMIDE AND IRRADIATION ON CELLS WHICH SUPPRESS CONTACT SENSITIVITY IN THE MOUSE. (Eng.) Zembala, M. (Inst. Pediatrics Medical Sch., Krakow, Poland); Asherson, G. L. *Clin Exp Immunol* 23(3): 554-561; 1976.

Contact sensitivity was produced in CBA mice by painting the skin with picryl chloride and was assessed by the increase in ear thickness following local challenge. Contact sensitivity was passively transferred by immune lymph node and spleen cells taken at four days. The mice were then challenged immediately and the reactions read at 24 and 48 hr. Immune lymph node and spleen cells taken at day eight virtually failed to transfer. Experiment showed that they contained cells which suppress passive transfer. These were demonstrated by mixing approximately equal numbers of four-day cells, which transfer contact sensitivity, and cells taken at later times and injecting them iv into recipients. These "suppressor cells" could be demonstrated by day six and were still present at day 11 after immunization. The precursors of the suppressor cells were sensitive to cyclophosphamide. Irradiation of immune mice two days before taking cells also selectively inactivated the suppressor cells. When mice were pretreated with cyclophosphamide before immunization or irradiated two days before transfer, the lymph node and spleen cells taken on day nine after immunization transferred contact sensitivity. In contrast, the same number of cells from untreated mice was inactive. This suggested that the cells which mediate passive transfer, or their precursors, may occur in an inhibited form in lymph nodes and spleen at later times after immunization. These suppressor cells in immune mice differ from the T suppressor cells produced by the injection of picryl sulphonic acid. This agent causes unresponsiveness as follows: the precursors of the T suppressor cells resist cyclophosphamide; and the T suppressor cells are found in mice treated so as to produce unresponsiveness, while the other type of suppressor cells occurs in mice immunized for contact sensitivity. However, both types of suppressor cells are selectively inactivated by irradiation as compared with the cells which mediate contact sensitivity, and both can act on the effector stage of contact sensitivity.

0885 INFLUENCE OF LEUKAEMIC CELLS ON THE COLONY FORMATION OF HUMAN BONE MARROW CELLS IN VITRO II. SUPPRESSIVE EFFECTS OF LEUKAEMIC CELL EXTRACTS.

(Eng.) Chiyoda, S. (Jichi Medical Sch., Minamikawachi-machi, Tochigi-ken, 329-04, Japan); Mizoguchi, H.; Asano, S.; Takaku, F.; Miura, Y. *Br J Cancer* 33(4): 379-384; 1976.

The influence of leukemic cells on the colony formation of human bone marrow cells was studied in vitro as an extension of previous work. An extract of leukemic bone marrow cells significantly suppressed the colony forming ability of the normal bone marrow cells, whereas an extract of normal bone marrow cells did not suppress it except in two cases. The suppressive effect of normal bone marrow cells, however, was obviously less intense than that of leukemic cells. This suppressive effect was dose dependent and was fairly stable to heat treatment. These results suggest that leukemic bone marrow cells contain factor(s) that suppress normal colony formation.

0886 IMMUNOSUPPRESSION BY MICROMOLECULAR FIBRINOGEN DEGRADATION PRODUCTS IN CANCER.

(Eng.) Girmann, G. (Medizinische Universitaetsklinik und Poliklinik, D-665 Homburg, W. Germany); Pees, H.; Schwarze, G.; Scheurlen, P. G. *Nature* 259(5542): 399-401; 1976.

Because both the degree of impairment of lymphocyte function and the frequency of fibrin degradation product (FDP) formation are related to the extent of neoplastic spread, the influence of micromolecular FDPs on cellular and humoral immune responses was investigated. Terminal FDPs were obtained by prolonged digestion of human fibrinogen with human plasmin in aqueous solution, and dialyzed against distilled water at 4 C for 24 hr. FDPs caused a dose-dependent suppression of phytohemagglutinin-induced lymphocyte transformation, which was 98% at 1.1 mg/ml. An iv injection of 100 µg FDPs simultaneous with an ip injection of SRBCs did not significantly alter the SRBC-specific immune response in Swiss mice, whereas 130-160 µg markedly inhibited the response in comparison to controls. The most striking immunosuppression (about 80%) occurred in mice treated with 130-160 µg 24 hr after priming. The sera of 19 donors with malignant disease and of three patients with hepatic cirrhosis were studied to determine a relation between immunosuppressive activity and circulating FDPs. The sera and/or Sephadex G-25-fractionated serum peaks of seven patients without signs of circulating FDPs revealed no immunosuppressive activity, whereas those of eleven patients with demonstrable FDP inhibited lymphocyte transformation markedly. These findings clearly demonstrate a time-dependent and dose-dependent immunosuppressive action of micromolecular FDP.

0887 CORRELATION BETWEEN SPECIFIC CYTOLYSIS AND EXPRESSION OF IDIOTYPIC RECEPTORS OF ALLOGRAFT-INFILTRATING CELLS.

(Eng.) Binz, H. (Uppsala Univ. Medical Faculty, Uppsala, Sweden); Wigzell, H.; Haeyry, P. *Nature* 259(5542): 401-403; 1976.

The cytolytic capacity and idiotypic expression of cells invading an in vitro sponge 'allograft' was investigated. Fibroblasts were allowed to invade sponge matrix allografts by ip implantation into DA, Lewis, or BN rats (these strains differ at the major histocompatibility locus). Five days later the sponges were removed and transplanted sc into the neck of Lewis or DA rats. These rats were killed 7 or 8 days later and the sponges, lymph nodes (axillary-inguinal and popliteal) and spleens were removed and cell suspensions were prepared. A highly selective increase of cells expressing idiotypes signifying anti-DA reactivity was found infiltrating DA grafts transplanted into Lewis rats. Further experiments showed a clear-cut positive correlation between the occurrence of an increased percentage of cells with anti-DA idiotypes and specific anti-DA cytolytic activity capacity of the same cell suspension. It was concluded that an allograft is invaded by a complex variety of cells carrying actively produced or passively adsorbed idiotypic receptors on the surface with specific reactivity for the target alloantigens.

0888 ANTI-LEUKAEMIA ACTIVITY AS A BYSTANDER EFFECT OF GRAFT-VERSUS-HOST REACTIONS.

(Eng.) Johnson, P. R. (Dept. Bacteriology, Univ. Sydney, N.S.W., Australia); Hersey, P. *Br J Cancer* 33(4): 370-378; 1976.

The production of graft-versus-host (GVH) reactions in (PVGc x Wistar)F_1 hybrids by the transfer of PVGc spleen cells resulted in significant resistance of these recipients to a subsequent challenge with the PVGc leukemia. Protection was markedly dependent on dose and timing of allogeneic cell transfer and was abrogated by irradiation of the cells prior to transfer. GVH activity was shown to be a prerequisite for induction of the protective effect but was equally effective when produced by

he transfer of Wistar spleen cells in place of
VGc cells. These results, plus the fact that in
itro investigations of possible immune mechanisms
ailed to demonstrate cytotoxic immunity in treated
ats, suggested a nonspecific ''bystander'' effect
s the mechanism of protection. The implications
f such a mechanism are discussed.

889 MACROPHAGE MIGRATION INHIBITION AND LYMPHOCYTE STIMULATION WITH MAMMARY
TUMOR VIRUS ASSOCIATED ANTIGENS IN BALB/C MICE

39179). (Eng.) Lopez, D. M. (Univ. Miami Sch.
edicine, P.O. Box 520875, Biscayne Annex, Miami,
L 33152); Ortiz-Muniz, G.; Sigel, M. M. *Proc Soc*
xp Biol Med 151(1): 225-230; 1976.

ymphocytes of Balb/c mice, which had been believed
o be devoid of mammary tumor virus (MTV) by sev-
ral criteria, demonstrated sensitivity to MTV
ntigens in blastogenic transformation and migra-
ion inhibition assays. The cause of this unex-
ected sensitivity was uncertain, but may have
een related to horizontal transmission of MTV or
o the selective derepression of certain portions
f vertically-transmitted viral genomes. Lympho-
ytes from MTV-positive Balb/cfC$_3$H mice were not
ensitive to MTV antigens, unless derived from
ice that had been implanted with MTV-positive
umors. These findings suggest either that there
as a state of tolerance to MTV antigens which was
roken by the tumor transplant, or that responses
ere directed towards antigens to which the host
s not tolerant.

890 LYMPHOCYTE TRANSFORMATION INDUCED BY AUTOLOGOUS CELLS. III. LYMPHOBLAST-IN-
UCED LYMPHOCYTE TO STIMULATION DOES NOT CORRELATE
ITH EB VIRAL ANTIGEN EXPRESSION OR IMMUNITY.

Eng.) Weksler, M. E. (Dept. of Medicine, Cornell
niv. Medical Coll., New York, NY 10021). *J Immunol*
16(2): 310-314; 1976.

he stimulation of allogeneic and autologous cul-
ured human lymphocytes by B lymphoblasts and the
ole in this reaction of Epstein-Barr (EB) viral
eterminants on the stimulating cells and immunity
f the lymphocyte donor to the EB virus was
tudied. The stimulatory capacity of cultured cell
ine lymphoblasts was not inhibited by incubating
ymphoblasts with antisera to EB viral deter-
inants. Cultured cell line B lymphoblasts stimu-
ated as much thymidine incorporation by lympho-
ytes from donors with or without immunity to the
B virus. Further, a B lymphoblast cell line (U-
98) which lacked the EB viral genome stimulated
s much lymphocyte proliferation as did B lympho-
last with the EB genome. Cultured T lymphoblast
ell lines did not stimulate allogeneic lymphocyte
roliferation. These cells appeared to lack the
eterminants which stimulated lymphocyte trans-
ormation. No evidence was found that cultured
ell line T lymphoblasts suppressed allogeneic
lymphocyte proliferation. Mitogen-induced lymphoblasts from EB-immune and non-immune subjects stimulated the proliferation of autologous lymphocytes comparably. It is concluded that neither immunity to the EB virus nor expression of EB viral antigens on mitogen-induced or cell line lymphoblasts is necessary for the stimulation of lymphocyte proliferation.

0891 RABBITS AS A SOURCE OF ANTISERA AGAINST SV40 VIRUS-INDUCED CELL SURFACE ANTIGENS.

(Eng.) Moolten, F. L. (Boston Univ. Sch. Medicine, Boston, MA 02118); Capparell, N. J. *Proc Soc Exp Biol Med* 151(1): 65-67; 1976.

The use of rabbits as an abundant source of antisera against simian virus 40 (SV40) induced cell surface antigens was investigated. New Zealand white rabbits were injected iv with transformed cells (8 x 10^7, line TRK73) that had been stirred with *Vibrio cholera* neuraminidase. All rabbits were reimmunized ip 3 wk later, and then received three more ip injections, at 2-wk intervals, of cells not treated with neuraminidase. Antisera were assayed by a mixed hemadsorption technique, using sheep erythrocytes. Rabbits immunized with SV40-transformed rabbit cells responded with antibodies which reacted against SV40-transformed hamster, mouse, and rabbit cells. Two sera failed to react against control cell lines (untransformed, or transformed with Herpesvirus type 2 or methylnitrosamine). A third antiserum reacted directly against three control lines; the possible presence of both SV40-specific antibodies and antibodies directed against antigens shared by cells not transformed by SV40 may account for these results. The growing list of species which seem to share SV40-specific surface antigens suggests that such antigens are virus-coded. Because of the abundance of sera obtained, rabbits may prove an important source of antibody for future studies, such as immunotherapy investigations, where large amounts of antibody are needed.

0892 THE EFFECT OF ANTILYMPHOCYTIC AND NORMAL HORSE SERUM ON GROWTH OF PRECANCEROUS FOCI AND DEVELOMENT OF TUMORS INDUCED BY DIETHYLNITROSAMINE IN RAT LIVER.

(Eng.) Scherer, E. (The Netherlands Cancer Inst., Amsterdam, The Netherlands); van Dijk, W. F. M.; Emmelot, P. *Eur J Cancer* 12(1): 25-31; 1976.

Islands induced by subcarcinogenic and carcinogenic doses of diethylnitrosamine (DENA) using carefully characterized horse antilymphocytic serum (ALS) and the effect of ALS on liver tumor formation by two procedures were studied. Sprague-Dawley rats received either a single subcarcinogenic dose of 10 mg DENA/kg 24 hr after two-thirds hepatectomy followed by horse anti-rat ALS once weekly for six weeks (procedure A), or a carcinogenic regimen of 8 mg DENA/kg/day with 2 ml ALS once weekly for six weeks (procedure B). The number and size of the precancerous foci (ATPase-deficient islands) induced in the livers by procedures A and B were measured; they did not differ statistically from those occurring in the respective controls (rats receiving normal, pre-immune horse serum or no serum). No serum used was toxic for rat liver. When procedure A-treated rats were subjected after another three weeks to 2.4 mg DENA/kg daily until death from liver tumors, no effect of the prior ALS on the death rate, as compared with the controls, was seen. When procedure B-treated rats were afterwards left untreated, the death rate from liver tumors in the ALS group was significantly enhanced as compared with the controls. The non-equivalence of the tumors in the ALS, normal horse serum, and non-serum groups made the results difficult to interpret. The sera presumably contained a factor that furthered tumor development other than by immune suppression. If the effect of ALS on the neoplastic process was also mediated by immune suppression, then the cells participating in the process of liver carcinogenesis probably became immunogenic to the cellular immune system beyond the precancerous stage of the ATPase-deficient island cell proper.

0893 ANTIBODY PRODUCTION IN PRECLINICAL HODGKIN'S DISEASE (Letter to Editor).

(Eng.) Jones, J. V. (Southmead Hosp., Bristol BS10 5NB, England); Peacock, D. B.; Greenham, L. W.; Bullimore, J. A. *Lancet* 1(7950): 92-93; 1976.

A highly significant depression of secondary antibody production was found at the stage of Hodgkin's disease before the patient had any symptoms and when only a single group of nodes was involved. At age 41, when the man seemed clinically normal, he took part in a study of antibody production to the bacteriophage phiX 174. The primary antibody peak was lower than in any of the other normal subjects. Six weeks later, when he was reinjected with bacteriophage particles, his peak titer was 1350, while the normal response was a uniform 26,000-50,000. Three and a half years later, the patient presented with a lymph node showing Hodgkin's disease of nodular sclerosing type without other diseased tissue. This case demonstrates that immunoparesis in Hodgkin's disease may be an early feature, and can occur in the absence of widespread distortion of lymph node architecture, splenic involvement, or immunosuppressive treatment.

0894 PURIFICATION OF TUMOR ASSOCIATED ANTIGENS FROM A METHYLCHOLANTHRENE INDUCED MURINE SARCOMA AS MONITORED BY HUMORAL CYTOTOXICITY.

(Eng.) Ristow, S. S. (Univ. Minnesota Medical Sch., Minneapolis, MN 55455); Cleveland, P. H.; Pier, T. R.; McKhann, C. F. *Prep Biochem* 5(5/6): 479-493; 1975.

Tumor associated antigens were purified from a methylcholanthrene sarcoma of syngeneic C57Bl/10 SN mice by detergent extraction, column chromatography and isoelectric focusing. The antigen was measured by a sensitive humoral cytotoxicity assay based on inhibition of uptake of ^{3}H thymidine by tumor cells growing in culture in the presence of antibody and complement.

0895 CELL CYCLE DEPENDENCY OF HUMAN SARCOMA-ASSOCIATED TUMOR ANTIGEN EXPRESSION.

(Eng.) Burk, K. H. (M.D. Anderson Hosp. and Tumor Inst., Houston, TX 77025); Drewinko, B.; Lichtiger, B.; Trujillo, J. M. *Cancer Res* 36(4): 1278-1283; 1976.

The cell cycle-dependent expression of tumor-associated antigen was analyzed in a human neurosarcoma cell line (T_2 cells). The expression of sarcoma-associated tumor antigen on T_2 cells was detected by use of sera from sarcoma patients; control sera were from patients with nonsarcoma neoplasias and from normal donors. The results indicated a progressive increase in the antigenic expression, beginning in late mitosis and early G_1, with maximum expression in mid-G_1. Antigenic expression declined to minimum levels in S and G_2.

0896 PRODUCTION OF MELANOMA-ASSOCIATED ANTIGEN(S) BY A DEFINED MALIGNANT MELANOMA CELL STRAIN GROWN IN CHEMICALLY DEFINED MEDIUM.

(Eng.) Chee, D. O. (Veterans Administration Hosp., Sepulveda, CA 91343); Boddie, A. W.; Roth, J. A.; Holmes, E. C.; Morton, D. L. *Cancer Res* 36(4): 1503-1509; 1976.

A human malignant melanoma cell strain, UCLA-SO-M14 (M14), was adapted to grow in serum-free, chemically defined medium (CDM). The 3 M KCl extract prepared from the CDM-grown cells (M14-CDM) was assayed against BC from melanoma patients, patients with other cancers, and normal donors by leukocyte migration inhibition (LMI). The WBC from 15 of 27 (56%) melanoma patients tested were LMI positive. In contrast, 4 of 18 (22%) other cancer patients and 5 of 30 (17%) normal donors' WBC were LMI positive. One of 14 melanoma patients was LMI positive for a control 3 M KCl extract from autologous muscle. Comparative studies were performed with the M14-CDM extract and a 3 M KCl extract from a freshly biopsied tumor specimen from the donor of the M14 cell strain. Seven of 12 (58%) melanoma patients' WBC were LMI positive to the M14-CDM extract, but only 2 of 12 (17%) were LMI positive to the autologous melanoma tissue extract. Furthermore, only 100 to 300 µg protein of M14-CDM extract were required to educe delayed cutaneous hypersensitivity response in 6 of 8 (75%) melanoma patients and 0 of 5 lung cancer patients, but 500 µg protein from biopsied autologous melanoma tissue extract were needed to produce delayed cutaneous hypersensitivity response in 24 of 42 (57%) melanoma patients and 7 of 28 (25%) nonmelanoma cancer patients. These data suggest that: (a) the M14-CMD cells synthesized melanoma-associated antigen(s)

(MAA) in CDM; (b) the 3 M KCl extraction procedure effectively removed the MAA from the M14-CDM cells; (c) the M14-CDM cells were a more potent source of MAA than the surgical autologous melanoma specimen; and (d) the M14-CDM cells provided a continuous source of standard MAA.

0897 PURIFICATION AND ANTIGENIC CHARACTERIZATION OF PLASMA MEMBRANE FROM HEPATOMA CELLS IN CULTURE (HTC CELLS). (Eng.) Sauvage, P. (International Inst. Cellular and Molecular Pathology and Universite Catholique de Louvain, avenue Hippocrate 75, 1200 Bruxelles, Belgium); Trouet, A.; Tulkens, P. *Arch Int Physiol Biochim* 83(5): 995-996; 1975.

Immunological analysis was used to investigate and characterize specific tumor antigens localized on the surface of cultivated hepatoma cells (HTC cells). Plasma membranes from these cells and from normal liver were purified using a discontinuous sucrose gradient and digitonin. [^{3}H] acetic anhydride-labeled Fab fragments of IgG from HTC immune sera were then incubated with plasma membranes from both HTC and liver cells (HPM and LPM, respectively). It was demonstrated that HPM and LPM share a certain number of common antigens; HPM display one or more specific antigens, which cannot be evidenced on LPM; conversely some LPM antigens are absent from HPM. These results suggest that, by comparison with plasma membrane of normal liver, plasma membrane of hepatoma cells displays new types of antigens.

0898 QUANTITATION OF LYMPHOCYTE RESPONSE TO ANTIGEN BY FLOW CYTOFLUOROMETRY. (Eng.) Braunstein, J. D. (Sloan-Kettering Inst. for Cancer Res., New York, NY 10021); Good, R. A.; Hansen, J. A.; Sharpless, T. K.; Melamed, M. R. *J Histochem Cytochem* 24(1): 378-382; 1976.

The response of human peripheral blood lymphocytes to antigenic stimulation was studied in vitro using flow cytofluorometry and an acridine orange (AO) staining technique for cellular DNA and RNA. Antigen-stimulated 'pyroninophilic' immunoblasts, identified by an increase in cellular content of RNA (red fluorescence with AO), were quantitated in triplicate cultures incubated up to seven days with and without bacterial antigen. These results were similar to ^{14}C-thymidine incorporation into identical cultures incubated in parallel. Cytofluorometric analysis showed a peak in percentage of immunoblasts after six days in culture, while maximum thymidine incorporation was seen on day seven. Cells from patients with depressed immune response secondary to cancer showed lower than normal antigen response by cytofluorometry. Kinetic studies revealed both a lower percentage of immunoblasts when compared to normal and a lower average per cell RNA content of the stimulated cells. AO cytofluorometry is suggested as a convenient method of simultaneously assessing lymphocyte proliferative response to antigen.

0899 STUDIES ON THE STRUCTURE AND IMMUNOLOGICAL ACTIVITY OF CARCINOEMBRYONIC ANTIGEN--THE ROLE OF DISULPHIDE BONDS. (Eng.) Westwood, J. H. (Royal Cancer Hosp., London SW3 6JB, England); Thomas, P. *Br J Cancer* 32(6): 708-719; 1975.

Carcinoembryonic antigen (CEA) was shown to contain no free cysteine thiol groups but six cystine disulfide bonds. 5,5'-Dithiobis-(2-nitrobenzoic acid) (DTNB) reacted with CEA only after reduction of the disulfide bonds with dithioerythritol. Reduction-alkylation of CEA using dithioerythritol and bromo-[1-^{14}C] acetic acid confirmed the presence of six disulfide bonds, as did oxidation of the glycoprotein with performic acid. The products from the DTNB and reduction-alkylation treatments of CEA had less capacity to inhibit the binding of [^{125}I]-CEA to anti-CEA in a radioimmunoassay than the original CEA but could, in sufficient quantities, totally inhibit the binding. Removal, using mercaptoethanol, of the thiol blocking groups from the DTNB-treated CEA resulted in a 55% recovery of antigenic activity. The product from the performic acid oxidation could only inhibit approximately 50% of the binding. Treatment of CEA with 0.533 M sodium periodate ($NaIO_4$) greatly reduced its antigenic activity, presumably a result of the oxidative cleavage of the disulfide bonds. No loss in activity, however, was observed when 5.33 mM $NaIO_4$ was used, and one treatment in sequence with periodate, borohydride and mild acid of CEA removed approximately 50% of the carbohydrate, including all of the fucose, sialic acid and 2-acetamido-2-deoxygalactose but did not change the antigenic activity.

0900 COMPARISON OF HISTOCOMPATIBILITY ANTIGENS ON CULTURED HUMAN TUMOR CELLS AND FIBROBLASTS BY QUANTITATIVE ANTIBODY ABSORPTION AND SENSITIVITY TO CELL-MEDIATED CYTOTOXICITY. (Eng.) Golub, S. H. (Univ. California Sch. Medicine, Los Angeles, CA 90024); Hansen, D. C.; Sulit, H. L.; Morton, D. L.; Pellegrino, M. A.; Ferrone, S. *J Natl Cancer Inst* 56(1): 167-170; 1976.

Human tumor and fibroblast tissue culture cells were compared to determine the suitability of fibroblasts as control cells in experiments on human tumor serology and cellular immunology. The results of absorption experiments indicated no qualitative difference in the HL-A antigenic profile of fibroblasts and melanoma cells derived from the same donor, suggesting that these two cell types have a similar number of HL-A antigens/cell. In four of five pairs tested, the fibroblasts displayed similar sensitivity to effector cells generated by mixed lymphocyte culture as did the tumor cells from the same donor, but there were some differences in the effects of specific alloimmune effector cells at high and low effector-to-target ratios on the two types of target cells. The authors conclude that fibroblasts are legitimate control target cells for studies in human tumor immunology, if screening assays are done to verify their antigenicity and sensitivity to cell-mediated cytolysis.

0901 DECREASED RESISTANCE IN SOME HETEROZYGOTES IN H-2-LINKED IMMUNE RESPONSE TO POLYOMA-INDUCED TUMOUR.

(Eng.) Oth, D. (Unit 95 of the Institut National de la Sante et de la Recherche Medicale, Plateau de Brabois, 54500 Vandoeuvre-Les-Nancy, France); Robert, F.; Berebbi, M.; Meyer, G. *Nature* 259(5541); 316-317; 1976.

A.SW parental mice (H-2s) and several hybrids were immunized with ascitic polyoma cells in order to compare the H-2-linked immune response of the heterozygotes with each other and with the parental strain. Two modes of immunization were used: (a) amputation of a tumor-bearing leg, the site of sc injection of 4×10^4 ascitic SEWA cells 15-25 days previously, and (b) three weekly sc injections of 10^6 plaque-forming units polyoma virus. One to three weeks after completion of immunization, mice received an ip challenge of 10^3 viable cells. Immunization considerably diminished susceptibility in A.SW and (A/Sn x A.SW)F_1 mice. This confirms that some F_1 hybrids can be less resistant than the parental strain to a parental strain-specific tumor, even after immunization. The results demonstrate that one half of the H-2 and H-2-associated genetic material may detectably influence the intensity of the anti-tumor-associated transplantation antigen immune rejection of a polyoma-induced tumor.

0902 SUBUNIT STRUCTURE, CELL SURFACE ORIENTATION, AND PARTIAL AMINO-ACID SEQUENCES OF MURINE HISTOCOMPATIBILITY ANTIGENS.

(Eng.) Henning, R. (Rockefeller Univ., New York, NY 10021); Milner, R. J.; Reske, K.; Cunningham, B. A.; Edelman, G. M. *Proc Natl Acad Sci USA* 73(1): 118-122; 1976.

Detergent and papain solubilized murine histocompatibility (H-2) antigens were compared by gel exclusion chromatography, ultracentrifugation, sodium dodecyl sulfate-polyacrylamide gel electrophoresis, and amino-acid sequence analysis. Detergent solubilized H-2 antigens (molecular weight 116,000) consisting of two disulfide-linked heavy chains (46,000 daltons) and two noncovalently associated light chains (12,000 daltons) were alkylated with iodoacetamide prior to extraction. This prevented the formation of a disulfide linkage between the two heavy chains. A water-soluble 51,000-dalton molecule (Fs) consisting of a 39,000-dalton fragment (FH) of the heavy chain and one intact light chain was obtained by papain digestion of cells or detergent extracts, indicating that the disulfide linkage between the heavy chains is located in the remaining membrane-associated portion (Fm). Amino-acid sequence analysis of the FH fragment of H-2Kb by radiochemical techniques showed that it is identical to the detergent solubilized H-2Kb heavy chain in eight positions for the three amino acids tested. These data indicate that the fragment FH derives from the amino-terminus of the heavy chain and suggest that it projects outward from the cell surface, while the carboxyl-terminal region is associated with the plasma membrane. The described amino-terminal sequence data have been found constant in H-2Kb, H-2Kd, H-2Kk, H-2Db, and H-2Dd gene products. These data support the hypothesis that the K and D products of the major histocompatibility antigen complex have evolved by gene duplication.

0903 RELATIONSHIP BETWEEN THE ENHANCED EXPRESSION OF HISTOCOMPATIBILITY ANTIGENS ON INTERFERON-TREATED L 1210 CELLS AND THEIR POSITION IN THE CELL CYCLE.

(Eng.) Killander, D. (Radiumhemmet, Karolinska Hosp. and Inst. Medical Cell Res. and Genetics, Medical Nobel Inst., Stockholm, Sweden); Lindahl, P.; Lundin, L.; Leary, P.; Gresser, I. *Eur J Immunol* 6: 56-59; 1976.

The cell cycle position of individual mouse leukemia L 1210 cells was determined by cytophotometric and autoradiographic techniques. The amount of histocompatibility antigens expressed on the surface of individual cells was also determined, simultaneously, by quantitative immunofluorescence. Interferon treatment by L 1210 cells was accompanied by an enhanced expression of histocompatibility surface antigens. The distribution of interferon-treated cells in the various phases of the cell cycle was similar to that for control cells. The enhanced expression of histocompatibility antigens was observed on interferon-treated cells in all phases of the cell cycle. Enhancement is apparently not due to a preferential concentration of these cells in any one particular phase of the cell cycle. Interferon may have an effect on the regulation of the expression of histocompatibility antigens, independent of its effect on cell division.

0904 MASTOCYTOMA-MEDIATED SUPPRESSION OF MIXED LYMPHOCYTE CULTURE AND MITOGEN RESPONSIVENESS.

(Eng.) DeLustro, F. (State Univ. New York, Upstate Medical Center, Syracuse, NY 13210); Argyris, B. F. *Cell Immunol* 21(1): 177-184; 1976.

Experiments to determine whether the P-815 cell line actively inhibited the proliferation of C57BL/6J spleen cells in vitro were conducted. Marine spleen cells (strains C57BL/6J and DBA/2J), stimulated in vitro by allogeneic spleen, displayed a strong proliferative response with the subsequent development of cytotoxic cells; this proliferation and sensitization was abrogated by the addition of mitomycin-treated or x-irradiated murine DBA/2 mastocytoma cells (P-815). The substance required for this depression of lymphocyte responsiveness was present in the cell-free supernatant fluids of P-815 cultures. The suppression appears to be due to interference with cell proliferation in the mixed lymphocyte culture, because the P-815 also prevented spleen cells from proliferating in response to the mitogens concanavalin A (Con A), lipopolysaccharide (LPS), and phytohemagglutinin (PHA). These findings may relate to the mechanism by which tumor cells escape the syngeneic or allogeneic host's immune response.

0905 ALPHA$_2$-GLOBULIN AND PROSTATIC CANCER: ALTERATION IN LEVEL AND IMMUNOSUPPRESSIVE PROPERTIES PRIOR TO AND FOLLOWING CRYOPROSTATECTOMY. (Eng.) Ablin, R. J. (Cook County Hosp., Chicago, IL 60612). *IRCS Med Sci* 4(2): 60; 1976.

The effect of sera obtained from eight patients with prostatic cancer prior to and following cryosurgery on phytohemagglutinin (PHA)-stimulated peripheral blood lymphocytes was investigated. Leukocyte migration as related to alterations in the level of alpha$_2$-globulin and the patients' clinical responsiveness were also studied. A proliferative response of peripheral blood lymphocytes to PHA occurred following cryosurgery in six patients, indicating a reduction in the suppressive ('blocking') properties in their sera. Serum from two patients, previously not suppressive, inhibited the migration of WBC following cryosurgery. Six patients showing a reduction in the suppressive effect of their serum postoperatively exhibited a concomitant reduction in alpha$_2$-globulin. Clinically, four of these patients had favorable clinical responses, and two had poor responses. The results reflect a general rather than a specific immunoresponsiveness of these patients.

0906 TUMOR-ASSOCIATED BLOCKING FACTORS: ISOLATION FROM SERA OF TUMOR-BEARING MICE. (Eng.) Tamerius, J. (Fred Hutchinson Cancer Res. Center, Seattle, WA 98104); Nepom, J.; Hellstrom, I.; Hellstrom, K. E. *J Immunol* 116(3): 724-730; 1976.

An isolation and partial purification of tumor-associated blocking factors from the sera of tumor-bearing BALB/c mice is described. The tumors used were methylcholanthrene-induced fibrosarcomas MCA-1315 and 1321. Columns for affinity chromatography were prepared by coupling syngeneic tumor-immune antibodies to Sepharose 4B. Passage of serum through such immunoadsorbent columns removed all blocking activity from tumor-bearers' sera; subsequent elution of the absorbent with 3 M NaSCN recovered the activity. The blocking material was further purified on Sephadex G-200. The data provide evidence for the presence of antigen in tumor-associated blocking factors and are compatible with the hypothesis that blocking factors often consist of antigen and antibodies in the form of immune complexes.

0907 SIGNIFICANCE OF ARMING, POTENTIATING AND BLOCKING FACTORS AS CORRELATES OF TUMOUR-HOST INTERACTION IN THE HAMSTER SV40 SYSTEM. (Eng.) Goldrosen, M. H. (Roswell Park Memorial 666 Elm St., Buffalo, NY); Dent, P. B. *Br J Cancer* 32(6): 667-677; 1975.

The presence of blocking factors against in vitro cell mediated cytotoxicity was investigated in male Syrian golden hamsters. By microcytotoxicity testing, progressor and immune peripheral blood lymphocytes caused significant target cell reduction. The cytotoxicity was specific as no cytotoxic effect was detected against unrelated normal as well as malignant target cell lines. No anti-tumor effect was noted when progressor peripheral blood lymphocytes were evaluated in the Winn assay. In marked contrast, immune peripheral blood lymphocytes were capable of preventing tumor growth in the Winn assay. Furthermore, hamsters repeatedly immunized with irradiated simian virus (SV)40 tumor cells could resist a live cell challenge. Thus immune peripheral blood lymphocytes were chosen as the effector population to evaluate the abrogation ability of serum in a microcytotoxicity assay. Serum taken from hamsters with progressively growing SV40 tumors did not block, neutralize or potentiate in vitro lymphocytotoxicity. However, serum taken from hamsters before the appearance of a palpable tumor potentiated in vitro lymphocytotoxicity. Serum taken from hamsters hyperimmunized with irradiated SV40 tumor cells or live SV40, or following complete excision of a growing SV40 tumor, armed normal effector cells and potentiated immune effector cells, resulting in enhanced target cell destruction. Serum alone was not cytotoxic, suggesting a serum dependent cellular cytotoxicity effect. Serum from hamsters in which tumors recurred after excision was capable of abrogating in vitro lymphocytotoxicity. However, no antibody activity was detectable to cell surface antigens by the mixed hemadsorption test in the sera that demonstrated blocking or potentiating activity. Progressor serum was unable to enhance the growth of SV40 tumor cells in vivo. Both cytostatic antibody activity and enhancement of in vitro lymphocytotoxicity activity correlate with in vivo tumor resistance. These results suggest that progressive primary tumor growth in this system may correlate with a lack of serum dependent cellular cytotoxicity rather than blocking factors, while the latter may be associated with recurrent and/or metastatic disease.

0908 CELL-MEDIATED IMMUNITY AND THE IDENTIFICATION OF SERUM 'BLOCKING' FACTOR IN PROSTATIC CANCER PATIENTS. (Eng.) Albin, R. J. (Cook County Hosp., Chicago, IL 60612). *IRCS Med Sci* 4(2): 61; 1976.

Five patients with prostatic cancer were evaluated by the leukocyte adherence inhibition test for the presence of anti-tumor immunity and serum 'blocking' factor. WBC from the patients were cultured independently with (a) normal human serum (NHS), (b) 3 M KCl extract of autologous prostatic tumor tissue plus NHS, and (c) autologous tumor extract plus patient's serum. The percent adherence was reduced in each case when compared to the normal percent adherence obtained in the absence of tumor extract, suggesting that an interaction of extract (antigen) with presumably sensitized WBC occurred. When the patients' WBC and tumor extracts were cultured in autologous serum, the percent adherence approximated or exceeded the levels obtained in the absence of extract, indicating the absence of interaction of antigen and cells. Evidence of the cross reactivity of the observed anti-tumor immunity with extracts prepared from tumors of the same type, and the specificity of 'blocking factor' for autologus tumor only, were similarly demonstrated using the leukocyte adherence inhibition test.

0909 STEM CELLS AND T AND B LYMPHOCYTES DURING TUMOR GROWTH.

(Eng.) Khaitov, R. M. (Inst. Biophysics, Ministry of Health, Moscow, USSR); Petrov, R. V.; Gambarov, S. S.; Norimov, A. S.; Blinov, V. A. *Cell Immunol* 22(1): 1-10; 1976.

Functional activities of T and B lymphocytes and the kinetics of hematopoietic stem cells were studied in mice with inoculated or spontaneous tumors. The development and growth of the tumor inhibited B cells and helper T cells, while the activity of killer T cells and spleen suppressor cells was markedly enhanced. The processes of stem cell migration from the bone marrow were considerably intensified and altered in tumor-bearing mice. Data suggest that helper T cells and killer T cells represent nonidentical compartments within the population of thymus-dependent lymphocytes. Immunosuppression during tumor bearing is probably due to an impairment of T lymphocytes cooperating in immune responses, B lymphocytes and their precursors. It is suggested that malignant tumors produce a substance that causes splenomegaly and that this perturbs the normal regulation of hematopoietic stem cells.

0910 IN VITRO CELL-MEDIATED IMMUNE REACTIONS OF MELANOMA AND COLORECTAL CARCINOMA IN PATIENTS DEMONSTRATED BY LONG-TERM ^{51}CHROMIUM ASSAYS.

(Eng.) Steele, G., Jr. (Wallenberg Lab., Univ. Lund, Lund, Sweden); Sjoegren, H. O.; Stadenberg, I. *Int J Cancer* 17(1): 27-39; 1976.

In a series of consecutive ^{51}Cr assays, 21 melanoma and 14 colorectal carcinoma patients were tested for their in vitro cell-mediated immune reactions to melanoma, rectal adenocarcinoma, and normal fibroblast target cells. Blood lymphocytes (BL) from four individuals were included in each experiment. In 9/14 experiments, the BL effects of two melanoma patients were compared to BL effects of two colorectal carcinoma patients. In two experiments, BL from one melanoma patient and one colorectal carcinoma patient were compared for cytotoxic effect with each other and with BL from two normal healthy donors, and in the remaining three experiments, BL from two melanoma patients were compared with BL from one healthy donor and one patient bearing a tumor that was neither a melanoma nor a colorectal carcinoma. Eleven out of 14 experiments were performed in a criss-cross manner. Target cells in the first three tests of this series consisted of tumor cells and fibroblasts explanted form a single melanoma patient. In all of the remaining experiments, each BL population was tested for cytotoxicity against both a tumor-fibroblast target cell pair explanted from one of two melanoma patients and a tumor-fibroblast target cell pair explanted from a rectal adenocarcinoma patient. Of 35 tumor patients, 27 demonstrated a selective cytotoxic effect on the tumor target cells compared to the corresponding fibroblasts, while four patients showed a selective effect on the fibroblasts, and 6/29 patients showed a selective effect on the other type of tumor cells compared to matching fibroblasts. In 8/11 experiments (including two repeat tests) tumor-specific BL effects were demonstrated in a criss-cross manner. BL separations and ^{51}Cr tests were repeated in 11 of the 35 patients 2-4 wk after their original tests. BL populations from these 11 patients reproduced their individual earlier effects, whether these effects showed specific, nonspecific, or no cytotoxicity. In each assay, differences in sensitivity between fibroblasts and tumor target cells in matched pairs were analyzed by comparing the effects of BL from the two controls. No differences in target-cell sensitivity could be demonstrated.

0911 ANTIGEN HETEROGENEITY OF HUMAN B AND T LYMPHOCYTES.

(Eng.) Rabellino, E. M. (Natl. Jewish Hosp. and Res. Center, Denver, CO 80206); Grey, H. M.; LaForge, S.; Pirofsky, B.; Kashiwagi, N.; Malley, A. *J Clin Invest* 57(2): 390-397; 1976.

The cell-surface antigens present on normal human lymphocytes, lymphocytes from patients with chronic lymphatic leukemia (CLL), and lymphoblastoid B cells were characterized using antisera raised in primates. Rhesus monkeys were immunized with normal human lymphoid cells, cultured lymphoid cells, and chronic leukemic lymphocytes and the antisera were analyzed by cytotoxicity and immunofluorescence techniques. To obtain a reagent specifically reactive with T-lymphocytes, an anti-spleen antiserum was absorbed with cells from five B-cell lines. Afte absorption, the antiserum killed 60 to 75% of peripheral blood lymphocytes and 40 to 50% of tonsil cells indicating a relation between the percentage of killed cells and the proportion of T lymphocytes. However, when cells after cytotoxic treatment were assayed for rosette formation with sheep erythrocytes (a T-cell marker), 5 to 20% of viable rosette-forming lymphocytes were found. Therefore, this antiserum was cytotoxic for only 75 to 90% of T cells. The authors conclude, from studies performed with antisera prepared against spleen and B-cell lines, that lymphoblastoid cells are antigenically different and deficient in comparison to normal B lymphocytes. In addition, cultured B-cell lines appear to be antigenically heterogeneous, as shown by the cytotoxic activity remaining in anti-spleen and anti-B-cell lines sera after absorption with various numbers and types of lymphoid cell lines. After absorption with normal lymphocytes, an antiserum produced against chronic lymphatic leukemia cells had specific activity associated with 12 chronic lymphatic leukemia cells tested. Absorption of the same antiserum with leukemic cells from two patients showed that a certain degree of antigenic heterogeneity also exists among chronic leukemic lymphocytes.

912 SURFACE MODULATION IN CELL RECOGNITION
AND GROWTH: SOME NEW HYPOTHESES ON PHENO-
YPIC ALTERATION AND TRANSMEMBRANOUS CONTROL OF
ELL SURFACE RECEPTORS. (Eng.) Edelman, G. M.
Rockefeller University, New York, NY 10021).
cience 192(4236): 218-226; 1976.

he author hypothesizes that the processes of cell
rowth, movement, and recognition are coordinated
y interaction of surface receptors and cytoplasmic
ibrillar structures. These processes are thought
o be regulated by alterations in the structure,
obility, and distribution of specific cell surface
eceptors. Cell surface glycoproteins appear to
lay a major role in these surface modulations.
ymphocytes and embryonic chick neural cells are
iscussed as models for this hypothesis. The H-2
istocompatibility antigen is thought to be in-
olved in immune recognition, rejection, and lysis.
T lymphocyte recognition system requiring a
iral antigen-histocompatibility antigen complex
s presented as a model for lymphocyte lysis of
umor cells. Experiments with chick embryonic
etinal cells indicate that cell-cell interactions
ay be controlled by surface proteins that are
ctivated by proteolysis of high molecular weight
lycoproteins. A surface modulating assembly con-
isting of glycoprotein receptors, microfilaments,
nd microtubules is presented as a model for an-
horage modulation. This modulation is thought to
e involved in stabilization of receptor sites and
ransmembrane control of such cellular processes
s movement, division, and cell-cell interactions.
he question of how cells coordinate signals for
hese processes is discussed with respect to the
uthor's hypotheses.

913 FACILITATION OR ATTENUATION OF MIXED
LEUKOCYTE CULTURE RESPONSIVENESS BY
DHERENT CELLS. (Eng.) Berlinger, N. T. (Memorial
loan-Kettering Cancer Center, 1275 York Ave., New
ork, NY 10021); Lopez, C.; Good, R. A. *Nature*
60(5547): 145-146; 1976.

he effect of adherent cells on human lymphocyte
roliferation in mixed leukocyte culture (MLC) was
tudied. Removal of adherent cells from both the
timulating and responding cell populations (by
iltration through columns of Sephadex G-10 beads
nd the use of 20% fetal calf serum for elution)
esulted in significantly decreased MLC reactivity
n spite of the fact that the relative proportions
f T and B lymphocytes in the column-filtered
ells were virtually unchanged. Filtered lympho-
ytes from 11 patients who had nonlymphoid malig-
ancies and an abnormally low relative response to
LC demonstrated significantly increased prolif-
rative capacities in response to each of four
ormal allogeneic stimuli compared with the com-
anion MLCs using unfiltered patient responding
ells. When column-filtered lymphocytes were used,
he MLC response of eight of these individuals
eturned to normal, and the remaining three re-
urned to near normal. The results confirm the
indings of others that adherent cells are neces-
sary for optimal MLC responsiveness, whether the adherent cell is isogeneic or allogeneic to the responding cell population. The results also suggest that increased proliferation of patient lymphocytes is mediated by allogeneic adherent cells in the normal irradiated stimulating cell population, giving further testimony to the nonspecific effects that mononuclear phagocytes may display in MLC.

0914 BRIEF COMMUNICATION: MEMBRANE MARKERS IN "HISTIOCYTIC" LYMPHOMAS (RETICULUM CELL SARCOMAS). (Eng.) Brouet, J. C. (Hopital Saint-Louis, 75475 Paris Cedex 10, France); Seligmann, M. *J Natl Cancer Inst* 56(3): 631-633; 1976.

Neoplastic cells from nine patients affected with poorly differentiated ''histiocytic'' lymphoma were studied with five membrane markers of B or T lymphocytes. In two patients a monoclonal B-cell proliferation was found; they had been affected previously with well documented B-cell proliferations: chronic lymphocytic leukemia or Waldenstrom's macroglobulinemia. The blast cells of two other patients had T-cell features; in a fifth case, the abnormal cells carried only a strong receptor for the Fc fragment of immunoglobulin, which suggested their truly monocytic origin. In four patients, the cells had no detectable surface markers. These findings demonstrate that this group of lymphomas is heterogeneous, that the term ''histiocytic'' is wrong in most instances, and that the cellular origin of the malignant cells frequently remains unidentified and thus prevents a satisfactory new classification.

0915 B LYMPHOCYTE SUBPOPULATIONS IN CHRONIC LYMPHOCYTIC LEUKEMIA. (Eng.) Rudders, R. A. (Tufts Sch. Medicine, 171 Harrison Ave., Boston, MA 02111). *Blood* 47(2): 229-235; 1976.

Two distinct subgroups of the lymphocytes from 26 chronic lymphocytic leukemia patients with B cell markers were identified and the differing clinicopathologic features were presented. The major variant (termed typical) was characterized by the presence of a relatively homogeneous population of small-to-medium-sized lymphocytes with low-density surface membrane IgM (SmIgM) and no evidence of intracellular Ig synthesis. A minor group (termed atypical) was identified by the presence of a pleomorphic cell population with few small lymphocytes. The predominant SmIg was IgG, which was detected intracellularly as well as in the serum. The atypical group appeared to be an arrest at a later stage of differentiation where a switch from IgM to IgG synthesis and secretion had occurred. Clinical correlation suggested several clear-cut differences in clinicopathologic characteristics, i.e. the typical variant contains more asymptomatic patients who required less specific therapy, but the median survivals for both groups at 2 yr was nearly identical.

0916 REDUCED RATES OF MEMBRANE TURNOVER IN LYMPHOCYTES FROM CHRONIC LYMPHATIC LEUKAEMIC PATIENTS.

(Eng.) Lewis, C. M. (Charing Cross Hosp. Medical Sch., London, England); Evans, C. A.; Pegrum, G. D. *Clin Exp Immunol* 23(2): 219-227; 1976.

Lymphocytes in chronic lymphatic leukemia (CLL) released labeled antibodies against surface antigens at a slower rate than healthy cells and ''escape from sensitization'' was similarly prolonged in the abnormal lymphocytes. This suggests that membrane turnover in CLL lymphocytes is abnormally slow. The leukemic cells turned over antisera more quickly after exposure to phytohemagglutinin (PHA) for 5 days. After exposure to nuclei from PHA-stimulated cells, membrane turnover from CLL lymphocytes was nearly equal to that of normal lymphocytes. Once this acceleration was achieved the leukemic lymphocytes no longer reacted to an antiserum with specificity for leukemic antigens, suggesting that the leukemic state of the CLL cell may be controlled by the surface membrane.

0917 SECONDARY IN VITRO LYMPHOCYTE-PROLIFERATIVE RESPONSES TO SYNGENEIC PLASMA CELL TUMORS.

(Eng.) Boyer, P. J. J. (Sch. Medicine, Univ. California, Los Angeles, CA 90024); Fahey, J. L. *Cancer Res* 36(4): 1492-1498; 1976.

The specificity and kinetics of postimmunization mixed lymphocyte-tumor interaction (MLTI) responses were evaluated for their relevance to specific antitumor immunity in vivo. Two characteristics of immune responses to weakly immunogenic plasma cell tumors were demonstrated. First, elevated lymphoproliferative responses following in vivo inoculation of sublethal doses of plasma cell tumors were detected by a mixed lymphocyte-tumor interaction (MLTI) assay. Specificity of elevated MLTI responses correlated with resistance to in vivo tumor challenge. These responses were dependent upon the presence of thymus-derived cells. Secondly, spleen and lymph node cells showed markedly different patterns of MLTI activity following plasma cell tumor immunization. Spleen cell responses were depressed for the first 30 days postimmunization, whereas lymph node cells showed augmented MLTI reactivity immediately after immunization. These observations indicate that lymphocyte populations from different lymphoid organs may show widely dissimilar responses in vitro at the same point in the in vivo development of tumor resistance.

0918 MURINE THYMIC LYMPHOMAS AS MODEL TUMORS FOR T-CELL STUDIES: T-CELL MARKERS, IMMUNOGLOBULIN AND FC-RECEPTORS ON AKR THYMOMAS.

(Eng.) Krammer, P. H. (Basel Inst. for Immunology, Basel, Switzerland); Citronbaum, R.; Read, S. E.; Forni, L.; Lang, R. *Cell Immunol* 21(1): 97-111; 1976.

Fifteen AKR thymic lymphoma lines (A, B, C, D, E, F, G, H, J, 2590, I, III, IV, V, IX) were studied for the presence or absence of T- and B-cell membra markers, immunoglobulin (Ig), Fe- and C'-receptors. All tumors carried Thy-1 antigen and mouse-specific lymphocyte antigen (MSLA), and nine out of 14 tumors were thymus leukemia alloantigen (TL) positive. Bone-marrow-derived lymphocyte antigen (MBLA) was expressed on none of these tumors. This is strong evidence that the tumor cells are malignant variants of normal T cells. The biosynthesis of Ig was shown for one T tumor. Ig on this tumor was present on the membrane of all cells. The Ig was a molecule which reacted with anti-$\mu\lambda$ antiserum. It had the size of a 10S molecule. Several of the tumors expressed Fc-receptors (FcR) for the constant portion of the γ-chain, preferentially IgG2b. One tumor was positive for Ig and FcR. C'-receptors were not found on any of the tumor lines. The results are discussed with the concept that the tumors might be a model for the study of T cells. Evidence was presented that membrane properties of the tumors are also found in normal T-cell subpopulations. It was suggested that the tumors represent the physiological variety of T-cells and that they might help to solve the problem of the T-cell receptor for antigen.

0919 IMMUNE REACTIVITY IN THE MOLONEY STRAIN OF MURINE SARCOMA VIRUS ONCOGENESIS: REQUIREMENT OF THYMUS-DERIVED LYMPHOCYTES FOR IN VIVO PROTECTION.

(Eng.) Collavo, D. (Inst. Pathological Anatomy, Univ. Padova, Padova, Italy); Colombatti, A.; Biasi, G.; Chieco-Bianchi, L.; Davies, A. J. S. *J Nat Cancer Inst* 56(3): 603-608; 1976.

The function of different lymphocyte populations in the Moloney strain of murine sarcoma virus (M-MuSV) tumorigenesis was studied by administering M-MuSV ip in CBA mice selectively deprived of thymus (T) lymphocytes by thymectomy, x-irradiation, and syngeneic bone marrow injection. Although no tumors appeared in the control group, 80% of the deprived mice had tumors that grew progressively and ultimately killed them. In deprived mice, grafted with a syngeneic thymus (reconstituted mice) before or after an M-MuSV injection, tumors regressed or did not develop. Histologically, the lymph nodes and spleens of reconstituted mice, compared to those of deprived animals, showed repopulation of the thymus-dependent areas and prominent follicles in the cortex. Moreover, tumor tissue of reconstituted mice was extensively infiltrated by lymphocytes. To evaluate the number of lymphoid cells needed to prevent or regress M-MuSV tumors, various amounts of lymphoid cells were injected ip into deprived mice. Even low lymphocyte numbers (10^6 cells) were sufficient to exert, in some cases, protection against M-MuSV tumorigenesis. This effect was not abolished by subsequent splenectomy or antilymphocyte serum treatment. Finally, deprived mice, given repeated injections of antiserum (hyperimmune) against M-MuSV, had tumors which appeared only after a prolonged latency. It is concluded that T-cell population integrity is important in affording total host protection against the M-MuSV tumors.

0920 TERMINAL TRANSFERASE IN HUMAN BONE-MARROW LYMPHOCYTES. (Eng.) Barr, R. D. (Natl. Cancer Inst., Bldg. 37, Room 5A-03, Natl. Inst. Health, Bethesda, MD 20014); Sarin, P. S.; Perry, S. M. *Lancet* 1(7958): 508-509; 1976.

Activity of the enzyme terminal deoxynucleotidyl transferase (TdT) was localized in normal human bone-marrow lymphocytes. A single bone-marrow aspirate was obtained from six normal adults. A pool of two aspirates was used for each experiment. The heparinized samples were separated by isopycnic sedimentation on ''Ficoll''-''Hypaque'' gradients, and the interface and sediment cell populations were harvested separately. Erythrocytes were removed from the latter by hypotonic lysis. These harvests were applied to sucrose gradients and further fractionated by velocity sedimentation at unit gravity (a technique which separates cells on the basis of differences in size rather than of density). Pools were separately pelleted and frozen for TdT estimation. Enzyme assays were performed. These cells may represent a prothymocyte population, which, on malignant transformation, may give rise to acute lymphoblastic leukemia, and to some cases of chronic granulocytic leukemia in the blastic phase.

0921 BEHAVIOUR OF LYMPHOCYTES FROM CANCER PATIENTS AND NORMAL INDIVIDUALS CULTURED WITH PHYTOHAEMAGGLUTININ. (Eng.) Pena, J. (Dept. Physiology and Biochemistry, Medical Sch., Granada, Spain); Garrido, F.; Aleman, P.; Garcia-Puche, J. L.; Osorio, C. *Rev Esp Fisiol* 31(1): 37-40; 1975.

Blood lymphocytes from cancer patients (22) with solid tumors without any previous immunosuppressive treatment and from normal individuals (14) were cultured in vitro with six different doses of phytohemagglutinin (PHA). Compared to the normals, 62% of the cancer patients had a minimal or no response to PHA; the rest, 38%, had a maximal response. However, the maximal response in these patients occurred at the high PHA doses, while the normal individuals showed their maximal activity at low PHA doses. The low PHA response in 62% of the cancer patients may indicate partial immunological impairment. The high response in 38% could mean that they have normal immunological function, but they differ from normals in the level of maximum response to PHA.

0922 EFFECT OF GLUCOCORTICOIDS ON FETOPROTEIN PRODUCTION BY AN ESTABLISHED CELL LINE FROM MORRIS HEPATOMA 8994. (Eng.) de Nechaud, B. (McArdle Lab. for Cancer Res., Madison, WI 53706); Becker, J. E.; Potter, V. R. *Biochem Biophys Res Commun* 68(1): 8-15; 1976.

The effect of glucocorticoids on the in vitro production of two serum fetoproteins in an established cell line from Morris hepatoma 8994 was studied. Glucocorticoids at concentrations equal to or higher than 10^{-7} M led to an increase of α-fetoprotein production by these cells. These cells also secreted αM-fetoprotein into the culture medium but only after addition of at least 4×10^{-7} M hydrocortisone or 5×10^{-8} M dexamethasone. The effects on both fetoproteins were observed in spite of a decrease of cell multiplication and an increase of cell detachment. This is the first time that the requirement of glucocorticoids for αM-fetoprotein has been demonstrated in vitro.

0923 TUMOR-BOUND IMMUNOGLOBULINS. I. FURTHER ANALYSIS OF THE CHARACTERISTICS OF BINDING OF IMMUNOGLOBULINS TO IN VIVO-GROWTH TUMOR CELLS. (Eng.) Dorval, G. (Royal Victoria Hosp., 687 Pine Ave. W., Montreal, H3A 1A1, Canada); Witz, I. P.; Klein, E.; Wigzell, H. *Int J Cancer* 17(1): 109-119; 1976.

Immunoglobulin (Ig) ''coating'' on different in vivo growing mouse tumors was investigated. Radioiodine-labeled purified protein A from *Staphylococcus aureus*, a specific reagent for Fc of IgG, and/or iodinated purified antibodies against mouse immunoglobulins, were fixed by various in vivo-grown mouse tumor cells, but not by the corresponding in vitro-cultivated tumor cells. Removal of host macrophages from the in vivo tumor cell preparations did not affect the fixation of anti-mouse Ig reagents by the tumor cells. After an initial lag period in vivo, the intensity of the Ig coating of tumor cells increased with time after tumor inoculation. Conversely, the detectable coating decreased rapidly with time after the tumor cells were explanted in vitro at 37 C. Iodoacetamide partially blocked this 37 C in vitro-induced ''uncoating process''. Surface-bound Ig could also be released from in vivo-coated tumor cells treated at low pH in vitro. At the membrane level, uncoating was best shown with in vitro incubation favorable to cellular metabolism; however, IgG was detected equally well in the supernatants of the cells, whether they were incubated at 37 C or at 4 C, and so far has failed to display antibody activity towards uncoated tumor cells. This was in contrast to the case of IgG released from ascites tumor cells cultured at low pH in vitro: such eluted Ig, when neutralized, could rebind to the ''same'' uncoated tumor cells. Under favorable metabolic conditions, the fate of tumor-bound Ig might be one of internalization and/or of degradation.

0924 TUMOR-BOUND IMMUNOGLOBULINS. EVIDENCE FOR THE IN VIVO COATING OF TUMOR CELLS BY POTENTIALLY CYTOTOXIC ANTI-TUMOR ANTIBODIES. (Eng.) Ran, M. (George S. Wise Center for Life Sciences, Tel Aviv Univ., Tel Aviv, Israel); Klein, G.; Witz, I. P. *Int J Cancer* 17(1): 90-97; 1976.

The immunoglobulin (Ig) coat of murine tumor cells induced by polyoma virus was studied to determine whether it consists in part of specific anti-tumor antibodies. The inoculation of polyoma virus-induced sarcoma cells (SEYF-a) into syngeneic A.BY mice stimulated the production of cytotoxic antibodies against the tumor-cell population. The level of these antibodies, undetectable during the first week after transplantation, increased markedly during the second week, and remained high thereafter. Following the increase in cytotoxic antibodies in the serum, a cell-bound potentially cytotoxic antibody was detected on the tumor cells by testing their sensitivity to rabbit complement. The increase in cell-bound, potentially cytotoxic antibody followed the kinetics of the increase in serum antibody during the second week after transplantation and was inversely correlated to the amount of free antigens on the cell surface. These antigens, responsible for the sensitivity of the cells to a syngeneic hyperimmune cytotoxic antiserum, became non-available for the cytotoxic antibodies during propagation of the tumor cells. Cells from a tumor propagated for three weeks could not compete for antitumor antibodies with cells propagated for one week. Yet it was possible to increase the antigenic capacity of cells from an old tumor by a treatment that would cause the release of tumor-associated Ig. Cytotoxic anti-SEYF-a antibodies could be dissociated from tumor cells propagated in vivo by methods causing dissociation of antigen-antibody complexes, and detected in tumor eluates. The results indicate that antigenic determinants on polyoma virus-induced tumor cells become coated with potentially cytotoxic antibodies during in vivo growth.

0925 IMMUNOGLOBULIN D. PHYSIOLOGY AND PATHOLOGY APART FROM MYELOMA. (Fre.) (Centre Hospitalo-Universitaire de Poitiers, Cite Hospitaliere de La Miletrie, 86021 Poitiers Cedex, France); Reboux, J.-F.; Becq-Giraudon, B.; Bontoux, D. *Pathol Biol (Paris)* 23(4): 315-321; 1975.

This review of literature concerning immunoglobulin D (IgD) shows that IgD is similar to the other immunoglobulins in its general molecular configuration, its synthesis in plasma and lymph, its secretion into the body fluids, and its antibody and occasional autoantibody characteristics. In addition, the massive augmentation of serum rates in the course of IgD myeloma and of gammopathies of nonmyelomatous monoclonal IgD is also similar. Unlike these immunoglobins, however, this surface antigen has low serum levels (0.03 mg/ml) due to low secretion, interstitial diffusion, and intense catabolism. On electrophoresis IgD migrates in the B-γ zone, on immunoeletrophoresis in the B_2 zone. Only one disulfide bridge links the two heavy chains. The light chains are predominantly λ. Anti-IgD antibodies are found in 37% of the healthy population. IgD does not take up complement but has an antibody function. Although it appears cytophilic, its immune response is not yet understood.

0926 MOUSE MYELOMA MUTANTS BLOCKED IN THE ASSEMBLY, GLYCOSYLATION AND SECRETION OF IMMUNOGLOBULIN. (Eng.) Weitzman, S. (Albert Einstein Coll. Medicine, Bronx, NY 10461); Scharff, M. D. *J Mol Biol* 102(2): 237-252; 1976.

The assembly, glycosylation, and secretion of immunoglobulins by two stable mutant cell lines derived from the MPC-11 mouse myeloma were examined. The mutants demonstrated a variety of blocks in these processes. The wild-type assembled and secreted 90% of its immunoglobulin primarily as H_2L_2, while M3.11 was partially blocked in the assembly of H_2L_2, and secreted approximately half of its immunoglobulin as HL. ICR 11.19, with a more complete block in interchain disulfide bond formation, assembled less than 10% of its immunoglobulin into H_2L_2, had a block in secretion, and degraded most of its immunoglobulin. M3.11 used only one of the two wild-type pathways of assembly Reduction of isolated H_2L_2 with 2-mercapthoethanol suggested an altered stability of the inter-H chain disulfide bonds in M3.11 as compared to the wild-type immunoglobulin. While the parent glycosylated all of its heavy chains, M3.11 did not attach any carbohydrate to 30-50% of its heavy chains. These nonglycosylated heavy chains were, nontheless, assembled and secreted with similar kinetics to the glycosylated heavy chain.

0927 CALCIUM IONOPHORES A23187 AND X537A AFFECT CELL AGGLUTINATION BY LECTINS AND CAPPING OF LYMPHOCYTE SURFACE IMMUNOGLOBULINS. (Eng.) Poste, P. (Roswell Park Memorial Inst., Buffalo, NY 14263); Nicolson, G. L. *Biochim Biophys Acta* 426(1): 148-155; 1976.

The membrane-associated microtubules involved in transmembrane control of cell surface receptor topography were studied to determine whether they were sensitive to changes in intracellular Ca^{2+} concentration created by treatment with the carboxylic ionophores A23187 and X537A. Mouse BALB/c 3T3 cells transformed or untransformed by simian virus 40 and spleen cells from 12-wk-old BALB/c mice were used. Ionophore activity was dependent upon the presence of Ca^{2+} (1.8×10^{-3} to 4×10^{-4} M in the culture medium. The K+-selective ionophore valinomycin had no effect on ligand-induced redistribution of surface receptors. It is suggested that A23187 and X537A impair membrane-associated microtubules involved in transmembrane control of receptor mobility and topography. In contrast to the action of colchicine and vinblastine that bind directly to microtubules, it is proposed that ionophores indirectly affect microtubules by raising the concentration of Ca^{2+} in the cytoplasm to levels that favor microtubule depolymerization and inhibit microtubule assembly.

0928 TRANSCRIPTION IN VITRO OF IMMUNOGLOBULIN KAPPA LIGHT CHAIN GENES IN ISOLATED MOUSE MYELOMA NUCLEI AND CHROMATIN. (Eng.) Smith, M. M. (Dept. Biology, Johns Hopkins Univ., Baltimore, MD 21218); Huang, R. C. C. *Proc Nat Acad Sci USA* 73(3): 775-779; 1976.

Messenger RNA (mRNA) sequences for immunoglobulin kappa light chain were synthesized in vitro in isolated mouse myeloma nuclei using bound endogenous RNA polymerase (RNA nucleotidyltransferase; nucleoside triphosphate:RNA nucleotidyl transferase; EC 2.7.7.6) and from isolated myeloma chromatin using exogenous *Escherichia coli* RNA polymerase. The in vitro RNA was transcribed using 5-mercuriuridine triphosphate and separated from in vivo RNA by chromatography on an agarose sulfhydryl affinity column. Template restriction was retained in vitro since synthesis of kappa chain mRNA, as determined by hybridization with complementary DNA, was much more efficient in nuclei and chromatin isolated from myeloma 66.2 tissue culture cells, a kappa-chain-producing cell line, than from MOPC 315 tissue culture cells, a lambda-chain-producing cell line. Transcription of kappa chain mRNA was 25 times more efficient in myeloma 66.2 nuclei than in myeloma 66.2 chromatin.

0929 CHARACTERIZATION OF THE TARGET CELL RECEPTOR FOR IGE. II. POLYACRYLAMIDE GEL ANALYSIS OF THE SURFACE IGE RECEPTOR FOR NORMAL RAT MAST CELLS AND FROM RAT BASOPHILIC LEUKEMIA CELLS.

(Eng.) Conrad, D. H. (Dept. Immunology, Univ. Manitoba, Winnipeg, Manitoba, Canada, R3E 0W3); Froese, A. *J Immunol* 116(2): 319-326; 1976.

Purified rat peritoneal mast cells (RMC) from female Lewis-Wistar rats and cultured rat basophilic leukemia (RBL) cells were surface labeled with ^{125}I by using lactoperoxidase, incubated with unlabeled rat monoclonal immunoglobulin (Ig)E and subjected to solubilization by treatment with Nonidet P-40 (NP-40). With both cell types, significant amounts of radioiodinated material could be specifically precipitated by a ''sandwich'' system consisting of rabbit anti-rat ε-chain and goat anti-rabbit Ig. The precipitates were dissociated with sodium dodecyl sulfate (SDS) and urea and analyzed by SDS-polyacrylamide gel electrophoresis. With RMC, three radioactive bands were seen. One corresponded to IgE present on the RMC at the time of isolation. A small band migrating in the region of light chain was seen with both specific (anti-IgE) and control precipitates. It showed no demonstrable relationship to IgE. The major radioactive band corresponded to a molecular weight of 62,000. This band was dependent upon the presence of IgE and was not found when non-IgE binding control cells were used. With RBL cells, only the IgE-dependent 62,000 dalton peak was present. Saturation of the IgE receptor sites of the RMC or RBL cells before lactoperoxidase labeling almost totally eliminated this radioactive band, indicating that cell-bound IgE rendered this membrane component inaccessible to the radiolabel. These results strongly suggest that this cellular component is identical, at least in part, with the target cell surface receptor for reaginic antibody. The data also further support the hypothesis that the neoplastic RBL cells have a normal surface receptor for IgE.

0930 SYNTHESIS OF SECRETORY COMPONENT BY COLONIC NEOPLASMS.

(Eng.) Poger, M. E. (New York Univ. Sch. Medicine, New York, NY 10016); Hirsch, B. R.; Lamm, M. E. *Am J Pathol* 82(2): 327-338; 1976.

The expression of the secretory component (SC) polypeptide chain of secretory immunoglobulin A, which can be considered as a differentiation marker, was studied in 36 colonic adenocarcinomas and 15 polyps (adenomatous and villous) by the expression fluorescent antibody technique. As in the normal mucosa, the synthesis of SC in tumors was found in non-mucus-containing columnar cells and was absent in goblet cells. However, in several well-differentiated carcinomas, columnar cells appeared to contain both SC and mucin; these cells may be analogous to the normal mucosal precursor of both cell types. SC was synthesized throughout all adenomatous polyps and villous adenomas with the exception of some atypical nonmucous nonmucinous areas of adenomatous polyps. SC synthesis by carcinomas was associated with mucus production, although goblet cells did not contain SC. The presence of SC also correlated with the degree of differentiation. Secretory component was absent from half of the carcinomas as well as from atypical nonmucinous areas of polyps, and this could represent one of the earliest changes associated with the development of malignancy.

0931 ACQUIRED C1-INHIBITOR DEFIENCIES IN LYMPHOPROLIFERATIVE DISEASES WITH SERUM IMMUNOGLOBULIN ABNORMALITIES. A STUDY OF THREE CASES.

(Eng.) Hauptmann, G. (Centre de Transfusion Sanguine 10, rue Spielmann, F-67085, Strasbourg Cedex, France); Lang, J.-M.; North, M.-L.; Oberling, F.; Mayer, G.; Lachmann, P. *Blut* 32(3): 195-206; 1976.

Three cases of acquired C1 inhibitor (C1-INH) deficiencies in patients with lymphoproliferative disease and abnormal serum immunoglobulins are reported. Two female patients (aged 66 and 61 yr) had chronic lymphocytic leukemia and circulating 7S IgM, and the third female patient (aged 53 yr) had lymphosarcoma, cold urticaria and a monoclonal IgG1-κ-kryoglobulin. The three patients had a complement profile similar to that seen in patients having an acquired deficiency of C1-1NH: low levels of total complement and of the early complement components (C1, C4, C2), normal levels of C3, C5, C6, C7 and normal function of the alternate pathway were found. Only the 61-yr-old patient with a profound diminution of C1-1NH showed symptoms of angioedema. Strong anticomplementary activity was present in the three sera, and in vitro tests demonstrated a high capacity of the sera to activate C1. The C1-1NH deficiency is most likely due to its interaction with activated C1. The following findings indicate an acquired C1-1NH depletion: absence of angioedema in the family, absence of C1-1NH deficiency in the patient's children, presence of extremely low levels of C1 in addition to low levels of C4 and C2, presence of an abnormal serum immunoglobulin and high serum anticomplementary activity directed toward C1 in a patient suffering from a lymphoproliferative disease.

0932 BINDING OF SECRETORY COMPONENT TO HUMAN IMMUNOGLOBULIN M. (Eng.) Lindh, E. (Institutionen for Medicinsk och Fysiologisk Kemi, Uppsala Universitetet, Box 575, S-751 23 Uppsala, Sweden); Bjork, I. *Eur J Biochem* 62(2): 271-278; 1976.

The binding of human free secretory component to immunoglobulin M (IgM) was studied in vitro as a model for the formation of complexes between the two proteins in vivo. Three IgM myelomas and normal serum IgM were found to bind secretory component in amounts from 0.8-2.0 molecules per molecule of IgM. This variation in binding was not related to a corresponding variation of the J-chain content of the immunoglobulins, but more likely was due to varying amounts of unspecifically bound serum proteins blocking the attachment of secretory component. In contrast to complexes with immunoglobulin A (IgA), the binding of secretory component to IgM appeared to be solely of a noncovalent nature, as all secretory component was released from complexes with IgM during gel chromatography in 6 M guanidine hydrochloride. Studies with tryptic fragments of one of the IgM myelomas indicated that the binding site for secretory component is located on the $(Fc)_{5}\mu$ part of the IgM pentamer. Finally, only minimal conformational changes were found to accompany complex formation between secretory component and IgM, analogous to what has earlier been reported for the attachment of the secretory component to IgA.

0933 MECHANISM OF ACTION OF BCG VACCINE ON NEOPLASTIC PROLIFERATION AND HOST IMMUNE RESPONSES. (Eng.) Hakim, A. A. (Coll. Medicine, Univ. Illinois at the Medical Center, Chicago, IL 60680); Grand, N. G. *J Pharm Sci* 65(3): 339-343; 1976.

0934 ISOLATION, CHARACTERIZATION, AND MECHANISM OF ACTION OF A COMPLEMENT INHIBITOR DERIVED FROM EHRLICH ASCITES TUMOR CELLS (Abstract). (Eng.) Renk, C. M. (Univ. Florida, FL). *Diss Abstr Int B* 36(8): 3863-B; 1976.

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0940 LOWERING OF INNATE RESISTANCE OF THE LUNGS TO THE GROWTH OF BLOOD-BORNE CANCER CELLS IN STATES OF TOPICAL AND SYSTEMIC STRESS. (Eng.) Van den Brenk, H. A. S. (St. Thomas' Hosp., London SE1 7EH, England); Stone, M. G.; Kelly, H.; Sharpington, C. *Br J Cancer* 33(1): 60-78; 1976.

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0942 A CRITIQUE OF THE EVIDENCE FOR ACTIVE HOST DEFENCE AGAINST CANCER, BASED ON PERSONAL STUDIES OF 27 MURINE TUMOURS OF SPONTANEOUS ORIGIN. (Eng.) Hewitt, H. B. (Mount Vernon Hosp., Northwood, Middlesex, HA5 2RN, England); Blake, L. R.; Walder, A. S. *Br J Cancer* 33(3): 241-259; 1976.

0943 IMMUNOLOGICAL RESULTS OBTAINED WITH AN EXPERIMENTAL MODEL OF GRAFTABLE COLONIC TUMORS. POSSIBLE APPLICATION TO HUMAN INTESTINAL CANCER. (Fre.) Martin, M. S. (Laboratoire d'Immunologie et Unite 45 INSERM, Faculte de Medecine, boulevard Jeanne-d'Arc, F 21000 Dijon, France); Martin, F. *Bull Cancer (Paris)* 62(4): 439-444; 1975.

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0968 THE PATTERNS OF FETAL HAEMOGLOBIN PRODUCTION IN LEUKAEMIA. (Eng.) Sheridan, B. L. (Dept. Hematol., Univ. Liverpool, Liverpool, England); Weatherall, D. J.; Clegg, J. B.; Pritchard, J.; Wood, W. G.; Callender, S. T.; Durrant, I. J.; McWhirter, W. R.; Ali, M.; Partridge, J. W.; Thompson, E. N. *Br J Haematol* 32(4): 487-506; 1976.

0969 STATISTICAL STUDY ON DOUBLE PARAPROTEINEMIAS. EVIDENCE FOR A COMMON CELLULAR ORIGIN OF BOTH MYELOMA GLOBULINS. (Eng.) Bouvet, J. P. (de l'Association Claude Bernard, Hopital Broussais, 96, rue Didot, 75674 Paris Cedex 14, France); Feingold, J.; Oriol, R.; Kiacopoulos, P. *Biomedicine* 22(6): 517-523; 1975.

0970 THE EVOLUTION OF ALPHA HEAVY CHAIN DISEASE. (Eng.) Guardia, J. (Dept. Internal Medicine, Pathology, and Biochemistry, Ciudad Sanitaria de la Seguridad Social, Universidad Autonoma, Barcelona 16, Spain); Rubies-Prat, J.; Gallart, M. T.; Moragas, A.; Martinez-Vazquez, J. M.; Bacardi, R.; Vilaseca, J. *Am J Med* 60(4): 596-602; 1976.

0971 B LYMPHOCYTES LACKING SURFACE IG IN PATIENT WITH IMMUNE DEFICIENCY: INITIATION OF IG SYNTHESIS IN CULTURE IN CELLS OF A PATIENT WITH THYMOMA. (Eng.) Siegal, F. P. (Sloan-Kettering Inst., New York, N.Y.); Wernet, P.; Dickler, H. B.; Shu, M. F.; Kunkel, H. G. *Birth Defects* 11(1): 40-44; 1975.

0972 DISTRIBUTION OF IODINE AMONG VARIOUS PARTS OF IODINATED NORMAL AND MONOCLONAL HUMAN IgG MOLECULES. (Eng.) Seon, B. K. (Dept. Immunology Res., Roswell Park Memorial Inst., 666 Elm St., Buffalo, NY 14263); Pressman, D. *Immunochemistry* 13(5): 407-415; 1976.

0973 TUMOR FC RECEPTORS AND TUMOR-ASSOCIATED IMMUNOGLOBULINS. (Eng.) Toender, O. (Broegelmann Res. Lab. for Microbiology, MFH-bygget, 5016 Haukeland sykehus, Bergen, Norway); Krishnan, E. C.; Jewell, W. R.; Morse, P. A., Jr.; Humphrey, L. J. *Acta Pathol Microbiol Scand Sect C* 84(2): 105-111; 1976.

0974 STUDIES ON THE FC RECEPTOR BEARING CELLS IN A TRANSPLANTED METHYLCHOLANTHRENE INDUCED MOUSE FIBROSARCOMA. (Eng.) Szymaniec, S. (Polish Acad. Sciences, Wroclaw, Poland); James, K. *Br J Cancer* 33(1): 36-50; 1976.

0975 MEMBRANE IG ON MPC11 MYELOMA CELLS: CORRELATION BETWEEN THE EXPRESSION OF MEMBRANE IG, A RECEPTOR FOR IG AND THE PROCESS OF SECRETION. (Eng.) Corte, G. (Istituto di Chimica Biologica, Viale Benedetto XV 1, Genova, Italy); Risso, A.; Ferrarini, M.; Bergellesi, A. *Eur J Immunol* 6(1): 3-8; 1976.

0976 HIGH TEMPERATURE TRYSINOLYSIS OF HUMAN IGA: ISOLATION OF THE FCα FRAGMENT. (Eng.) Calvanico, N. J. (Mayo Medical Sch., Rochester, MN 55901); Tomashi, T. B. *Immunochemistry* 13(3): 203-208; 1976.

0977 HUMAN MONOCLONAL IMMUNOGLOBULINS WITH ANTIBODY-LIKE ACTIVITY. (Eng.) Freedman, M. (Inst. Immunology, Univ. Toronto, Toronto, Ontario, M5S 1AL, Canada); Merrett, R.; Pruzanski, W. *Immunochemistry* 13(3): 193-202; 1976.

0978 INTERACTIONS OF THE LANTHANIDE- AND HAPTCH-BINDING SITES IN THE FV FRAGMENT FROM THE MYELOMA PROTEIN MOPC 315. (Eng.) Dwek, R. A. (Depts. Biochemistry and Molecular Biophysics, Univ. Oxford, South Parks Rd., Oxford OX1 3QU, U.K.); Givol, D.; Jones, R.; McLaughlin, A. C.; Wain-Hobson, S.; White, A. I.; Wright, C. *Biochem J* 155(1): 37-53; 1976.

0979 DIFFERENTIAL AGGLUTINABILITY OF RAT RED BLOOD CELLS DURING FETAL DEVELOPMENT BY CONCANAVALIN A. (Eng.) Mori, Y. (Center for Adult Diseases, Osaka, 1-3 Nakamichi, Higashinari-ku, Osaka 537, Japan); Akedo, H.; Tanigaki, Y.; Okada, M. *Cytobiologie* 12(2): 397-406; 1976.

0980 FURTHER STUDIES ON THE THYMOCYTE STIMULATING FACTOR. (Eng.) Chen, D.-M. (Vanderbilt Univ., Nashville, TN 37235); Di Sabato, G. *Cell Immunol* 22(2): 211-224; 1976.

See also:

* (Rev): 0616, 0618, 0625, 0626, 0627
* (Chem): 0648, 0666, 0714, 0720
* (Viral): 0767, 0771, 0772, 0776, 0777, 0780, 0783, 0798, 0800, 0801, 0813, 0828, 0835, 0838, 0844, 0864, 0868, 0873, 0874
* (Path): 0993, 0995, 0996, 0998, 0999, 1036, 1044, 1054, 1059, 1060, 1062, 1063, 1070, 1089, 1090
* (Epid): 1098

0981 MARKER CHROMOSOME 14Q+ IN TWO NON-BURKITT LYMPHOMAS. (Eng.) Prigogina, E. L. (Inst. Experimental and Clinical Oncology, AMS USSR, Kashirskoje Shosse, 6, 115478, Moscow, USSR); Fleischman, E. W. *Humangenetik* 30(2): 109-112; 1975.

Marker chromosome 14q+ was detected by G banding in two cases of non-Burkitt lymphomas. Chromosome 14q+, similar to the marker of Burkitt lymphoma, was found in all malignant cells in the blood of a patient with a generalized lymphosarcoma and in all lymph node cells and in part of the blood cells in a case of chronic lymphocytic leukemia. The authors suggest that the Epstein-Barr virus may induce not only Burkitt lymphomas but other lymphomas as well. The identity of the marker corresponds to a similar etiology of the tumors.

0982 DNA REPAIR AND FREQUENCY OF X-RAY AND U.V.-LIGHT INDUCED CHROMOSOME ABERRATIONS IN LEUKOCYTES FROM PATIENTS WITH DOWN'S SYNDROME. (Eng.) Lambert, B. (Karolinska Hosp., S-104 01 Stockholm, Sweden); Hansson, K.; Bui, T. H.; Funes-Cravioto, F.; Lindsten, J.; Holmberg, M.; Strausmanis, R. *Ann Hum Genet* 39(3):293-303; 1976.

DNA-repair and the frequency of chromosome aberration after UV and X-irradiation were studied in WBC from patients with Down's syndrome. The UV-induced DNA-repair synthesis was followed by the incorporation of $[^3H]$thymidine in the presence of hydroxyurea. Similar dose-response curves were established for Down's syndrome leukocytes and controls. The cells from patients with Down's syndrome incorporated 70-75% of the activity of control cells at the various doses (32-196 erg/mm^2). This difference was significant for the two highest UV doses. The yield of dicentric chromosomes after X-ray exposure (150 rad) was 35% higher in Down's syndrome leukocytes than in the control cells. Combined UV and X-irradiation caused a twofold increase in the frequency of dicentric chromosomes in control cells, while the increase was only 27% in Down's syndrome WBC. This synergistic effect of UV and X-irradiation on the yield of dicentric chromosomes suggests that healing of X-ray and UV-induced DNA lesions may partly utilize the same repair enzymes. The results also indicate that DNA repair mechanisms are impaired in WBC from patients with Down's syndrome, which may contribute to the increased incidence of leukemia and the susceptibility to irradiation in this disorder.

0983 DIENCEPHALIC SYNDROME REVISITED. (Eng.) Burr, I. M. (Vanderbilt Univ. Sch. Medicine, Nashville, TN 37232); Slonim, A. E.; Danish, R. K.; Gadoth, N.; Butler, I. J. *J Pediatr* 88(3): 439-444; 1976.

Diencephalic syndrome, a fatal disease of children, is reviewed in detail. The syndrome presents a wide variety of clinical signs which hinder accurate and quick diagnosis, as shown by the five case histories included and a review of 67 additional patients with the tumor. Since the mean survival time of untreated patients is 12 mo and the average lag time for diagnosis is 7-20 mo, quick and accurate diagnosis is critical. The two most useful clinical presentations are active, overalert appearance and malignant cells or increased protein in the cerebrospinal fluid. Therefore, early lumbar puncture is needed in investigations of these patients. The survival rate for treated patients is 91%, and combined surgery and radiotherapy appears to be the treatment of choice. The authors correlate the clinical presentations with the location of the tumors and conclude that there are anatomical bases for accepting similarities in clinical presentations of anatomically disparate tumors.

0984 TESTICULAR NEOPLASM IN SIBLINGS. (Eng.) Ghosh, P. (6767 West Outer Drive, Detroit, MI 48235); Jacobs, H.; Rattner, W. H. *Urology* 7(2): 212-213; 1976.

Four cases of testicular tumors in siblings were examined. The first set of brothers (ages 23 and 31) had anaplastic seminoma of the right testis and embryonal carcinoma of the left testis with lymphatic and vascular permeation, respectively. Another set of brothers (ages 24 and 37) had seminoma with extension through the tunica vaginalis and into the adjacent soft tissues at the testicular hilum, and teratocarcinoma, respectively. The 23- and 24-yr-old men received postoperative radiotherapy; the 31- and 37-yr-old men received postoperative chemotherapy. All are well to date. Testicular tumors are a leading cause of death among men in the 25- to 34-yr age group. One of these cases had unsuccessful hormone treatment for undescended testes (the 31-yr-old); this patient had a twin who also had an undescended testis and who later developed an atrophic left testis with a symptomatic varicocele. This suggests the need for long-term follow-up of patients who undergo orchiopexy, as did these two men. In the two sets of siblings each had a histologically different germinal tumor. This favors dysgenesis and the totipotentiality of the cells being responsible in the genesis of various testicular tumors.

0985 CHILDHOOD CANCER IN SIBS. (Eng.) Li, F. P. (35 Binney St., Boston, MA 02115); Tucker, M. A.; Fraumeni, J. F. *J Pediatr* 88(3): 419-423; 1976.

Thirty-eight families with cancer in two or more children were identified from hospital records. Neoplasms developed in one pair of identical twins and in 37 sets of sibs (2 with 4 affected sibs, 4 with 3, and 31 sib-pairs). Predisposition to cancer extended to their parents and other relatives, and subsequently to other sibs who were unaffected at the time of ascertainment of the cancer-prone families. Genetic susceptibility was suggested in individual families by parental consanguinity or by an inherited disorder predisposing to cancer, but in other instances no oncogenic factors were identified.

0986 THE OCCURRENCE OF HEPATOMA IN THE CHRONIC FORM OF HEREDITARY TYROSINEMIA. (Eng.)

Weinberg, A. G. (Children's Medical Center, 1935 Amelia St., Dallas, TX 75235); Mize, C. E.; Worthen, H. G. *J Pediatr* 88(3): 434-438; 1976.

A case of hepatocarcinoma complicating hereditary tyrosinemia in a 5.5-yr-old girl is presented, as well as a review of the literature and an attempted followup of previously reported patients with the chronic form of hereditary tyrosinemia. The results disclosed 16 cases of hepatocarcinoma occurring in 43 patients surviving beyond 2 yr of age (37%). This incidence is considerably higher than that generally given for the occurrence of hepatoma in adults with macronodular cirrhosis. Females and males are equally at risk. Additional factors beyond the development of cirrhosis are likely operative in the induction of hepatocarcinoma in patients with this metabolic disorder; those surviving beyond infancy are at considerable risk for the development of fatal hepatic neoplasms.

0987 NEUROBLASTOMA IN FATHER AND SON. (Eng.)

Arenson, E. B., Jr. (Children's Hosp., 1056 E. 19th Ave., Denver, CO 80218); Hutter, J. J.; Restuccia, R. D.; Holton, C. P. *JAMA* 235(7): 727-729; 1976.

Two cases of neuroblastoma, seen in a father and his son, were reviewed. The father showed symptoms at 9 mo of age; he vomited 2-3 times daily and had palpable abdominal mass. Surgery revealed a large retroperitoneal tumor behind the pancreas, extending from the left kidney to the region of the gall bladder. Biopsy showed anaplastic cells with dark nuclei, many mitotic figures, and areas of rosette formation. Radiation therapy was given; there was no recurrence. This man's son had an abdominal mass first detected at the age of 4 mo. A scout film of the abdomen showed speckled calcium in the mass. There was displacement of the left kidney laterally. Laparotomy revealed a large retroperitoneal mass adjacent to the left kidney and extending to the right kidney. The biopsy showed neuroblastoma with focal vascular involvement. Chemotherapy with vincristine sulfate (0.5 mg) and cyclophosphamide (100 mg) both iv, was given first weekly, then on alternate weeks. One month after the onset of therapy, the mass was no longer palpable. One year after diagnosis there was no evidence of recurrence. The father's course suggests that other, unknown, mechanisms are involved in this tumor's regression in addition to the radiotherapy. Both father and son had no evidence of distant metastases. It was suggested that all siblings and offspring of neuroblastoma patients be carefully followed up during their 1st yr of life.

0988 MULTIPLE MYELOMA, ACUTE LEUKEMIA, AND HODGKIN'S DISEASE: OCCURRENCE IN THREE OF FOUR FAMILY MEMBERS. (Eng.)

Kyle, R. A. (Mayo Clinic and Mayo Foundation, Rochester, MN 55901); Henderson, E. S.; Randolph, V. L.; Budge, W. R. *Cancer* 37(3): 1496-1499; 1976.

Among a family of four persons, three members each had a separate malignant disease during a three-year period. The mother and father concurrently had multiple myeloma and Hodgkin's disease, respectively, and less than three years later, their only son was found to have acute granulocytic leukemia. No increased incidence of deaths attributed to Hodgkin's disease, acute leukemia, or multiple myeloma was found in the community. No known exposure to environmental agents such as excessive radiation, benzene, or chloramphenicol occurred in this family.

0989 CEA FAMILY SYNDROME. ABNORMAL CARCINOEMBRYONIC ANTIGEN (CEA) LEVELS IN ASYMPTOMATIC RETINOBLASTOMA FAMILY MEMBERS. (Eng.)

Felberg, N. T. (Wills Eye Hosp., 1601 Spring Garden St., Philadelphia, PA 19130); Michelson, J. B.; Shields, J. A. *Cancer* 37(3): 1397-1402; 1976.

Plasma carcinoembryonic antigen (CEA) levels were studied in all available members of 17 families in which a presumed sporadic retinoblastoma had occurred. In nine of the 17 families, close relatives of the patient had elevated CEA levels in the absence of demonstrable disease; this was termed the 'CEA family syndrome.' In two families, one or both parents and all of the siblings had elevated CEA levels. This is apparently the first report of abnormal CEA levels in unaffected family members of patients with nonadenocarcinoma-type malignancies. As follow-up studies of such families become available, detection of the 'CEA family syndrome' may prove to be a useful means of locating individuals with inherited premalignant or malignant conditions, and may provide a stimulus for additional clinical examination of asymptomatic individuals considered at risk for developing malignancies.

0990 IDENTICAL TWINS DISCORDANT FOR ULCERTIVE COLITIS WITH COLON CANCER. (Eng.)

Bisordi, W. (Memorial Sloan-Kettering Cancer Center, 1275 York Ave., New York, NY); Lightdale, C. J. *Am J Dig Dis* 21(1): 71-73; 1976.

A 22-yr-old patient with a 16-yr history of ulcerative colitis who developed multifocal anaplastic colon cancer is presented. His identical twin, proved by blood type, HL-A, and fingerprint analyses, is completely asymptomatic. This suggests that ulcerative colitis results from a polygenic predisposition without full penetrance. The development of cancer seems related primarily to the inflammatory disease and its age of onset, duration, activity, and extent, rather than to an independent genetic determinant.

0991 RHABDOMYOSARCOMA IN THE PEDIATRIC AGE GROUP. (Eng.) Hornback, N. B. (Indiana Univ. Sch. Medicine, 1100 West Michigan St., Indianapolis, IN 46202); Shidnia, H. *Am J Roentgenol* 126(3): 542-549; 1976.

Forty-five consecutive cases of pediatric rhabdomyosarcoma were studied as to age at onset, histological type, primary site, stage of disease when first seen, method of treatment, and survival. From these cases, it appeared that rhabdomyosarcoma is a radiosensitive tumor, which could be controlled locally with radiation alone or in combination with surgery to excise the bulk of the tumor mass. On the other hand, chemotherapy must play a major role in treatment since most cases were first seen in the late stages of the disease. Close cooperation among a wide range of specialists, such as the pediatrician, radiation therapist, pediatric oncologist, pathologist, and surgeon is essential for a maximum therapeutic effect in children with this rare but aggressive tumor.

0992 DEGRANULATION MECHANISMS IN HUMAN LEUKEMIC BASOPHILS. (Eng.) Dvorak, A. M. (Massachusetts General Hosp., Boston, MA 02114); Dickersin, G. R.; Connell, A.; Carey, R. W.; Dvorak, H. F. *Clin Immunol Immunopathol* 5(2): 235-246; 1976.

The peripheral blood basophils of a 71-yr-old male patient with chronic myelogenous leukemia, basophilic phase (up to 85% of circulating leukocytes were mature basophils), and substantially elevated levels of urine histamine were studied in the electron microscope in an attempt to relate morphologic changes to possible mechanisms of mediator secretion. It was found that more than half of the mature circulating basophils were degranulated, and less than 11% of them were fully granulated. Two patterns of basophil degranulation were recognized: (a) anaphylactic-type degranulation, involving fusion of adjacent granule membranes with each other and with the plasma membrane, permitting continuity between granules and the cell exterior; (b) a vesicular transport mechanism involving pinocytotic cytoplasmic vesicles. The anaphylactic mechanism probably accounted for the bulk of histamine release occurring in this patient, in contrast to volunteers with allergic contact dermatitis in whom the vesicular mechanism is more prominent. Even though leukemic basophils closely resemble their normal counterparts, they differ in a number of physiological aspects.

0993 THE HETEROGENEITY OF LEUKEMIC RETICULOENDOTHELIOSIS, "HAIRY CELL LEUKEMIA." EVIDENCE FOR ITS MONOCYTIC ORIGIN. (Eng.) Scheinberg, M. (Univ. Hosp., Boston, MA 02118); Brenner, A. I.; Sullivan, A. L.; Cathcart, E. S.; Katayama, I. *Cancer* 37(3): 1302-1307; 1976.

The presence of B-lymphocyte, T-lymphocyte, and monocyte markers was studied in the spleen and peripheral blood mononuclear cells from two patients with leukemic reticuloendotheliosis. A high proportion of cells from both patients bore a receptor for cytophilic antibody, both in suspension and frozen tissue section. Cells in suspension lacked surface immunoglobulins or a receptor for SRBC. These results support evidence that 'hairy cells' are monocytic in origin.

0994 CHROMOSOMES AND CAUSATION OF HUMAN CANCER AND LEUKEMIA. XI. CORRELATION OF KARYOTYPES WITH CLINICAL FEATURES OF ACUTE MYELOBLASTIC LEUKEMIA. (Eng.) Sakurai, M. (Roswell Park Memorial Inst., Buffalo, NY 14203); Sandberg, A. A. *Cancer* 37(1): 285-299; 1976.

The karyotic aspects of patients with acute myeloblastic leukemia (AML) were examined. AML patients with chromosomal abnormalities in their bone marrow cells were divided into those with minor karyotypic abnormalities (MIKA) and those with major karyotypic abnormalities (MAKA). One of the largest subgroups in the MIKA group was shown to have cytologic characteristics typical of so-called ''classical'' AML and a ''prototypic'' karyotype, which has been shown to be due to translocation between chromosomes No. 8 and No. 21. A missing Y chromosome in AML was mostly associated with this karyotype. Patients of the MAKA group were usually erythroleukemic, had no or very few normal metaphases among the abnormal ones in the marrow, and almost invariably showed karyotypic instability. Karyotypic differences did not affect the patients' survival after the initiation of chemotherapy as much as did the presence or absence of normal metaphases. However, the karyotypes do appear to be relevant to the decision as to whether a patient should be administered chemotherapy when no normal metaphases are found on the initial bone marrow examination. The authors conclude that a good response to chemotherapy is expected in: AML patients under 70 yr of age with an an-marrow (having abnormal and normal metaphases or n-marrow (having normal metaphases only) before therapy and patients under 70 yr of age with near-aa-marrows (having abnormal metaphases only) or those with aa-marrows with ''prototypic'' or ''+C'' (characterized by an extra group C chromosome) abnormality. Patients over 70, and patients with aa-marrows, and with karyotypes other than ''prototypic'' or ''+C'' respond to chemotherapy very poorly, and administration may even shorten their life span.

0995 μ-CHAIN DISEASE IN A CASE OF CHRONIC LYMPHOCYTIC LEUKAEMIA AND MALIGNANT HISTIOCYTOMA. I. CLINICAL ASPECTS. (Eng.) Jonsson, V. (Gentofte Univ. Hosp., Hellerup/Copenhagen, Denmark); Videbaek, A.; Axelsen, N. H.; Harboe, M. *Scand J Haematol* 16(3): 209-217; 1976.

A 27-yr-old woman with proteinuria and normal serum creatinine for ten yr developed chronic lymphocytic leukemia (CLL); after 2 yr (during treatment with prednisone and chlorambucil), a malignant histiocytoma appeared, and free μ-chains appeared in serum. It is possible that μ-chain disease (μ-CD) and Bence-Jones proteinuria had persisted unrecognized for 12 yr, because vacuolated plasma cells were found when the primary bone marrow smear was re-evaluated, and no glomerular disorders were found. The clinical findings from the 11 known cases of μ-CD are reviewed. The patients's mother died of acute leukemia at the age of 24. The mother's sister has mammary carcinoma and several members of the mother's line apparently have increased tendency to infections. Of 27 family members, none exhibited immunoglobulin defects, but 10 members of the mother's line had B- as well as T-lymphocytosis, and 5 members had leukocytosis.

0996 μ-CHAIN DISEASE IN A CASE OF CHRONIC LYMPHOCYTIC LEUKAEMIA AND MALIGNANT HISTIOCYTOMA. II. IMMUNOCHEMICAL STUDIES. (Eng.) Axelsen, N. H. (The Protein Lab., Univ. Copenhagen, Sigurdsgade 34, DK-2200 Copenhagen N, Denmark); Harboe, M.; Jonsson, V.; Videbaek, A. *Scand J Haematol* 16(3): 218-225; 1976.

Agarose gel electrophoresis of serum from the 11th known case of μ-chain disease (μ-CD) showed two distinct abnormal bands due to free light chains and κ-complexes with other serum proteins. This caused diagnostic difficulties on conventional immunoelectrophoresis, and crossed immunoelectrophoresis with intermediate gel was demonstrated as a superior tool for investigation of μ-CD. A simple rocket immunoelectrophoresis method for μ-CD screening is also presented. The μ-CD protein had α-2-mobility and a part of the protein carried κ-determinants probably due to secondary binding. Preparative ultracentrifugation and size chromatography on serum demonstrated that the μ-CD protein was present in serum in several sizes, the smallest being a dimer of μ-chains. Due to scarcity of material, the abnormal protein could not be characterized further.

0997 CORRELATIONS BETWEEN CLONE PH 1 AND THE LEUKOCYTE ALKALINE PHOSPHATASE IN THE ASSOCIATION OF CHRONIC MYELOID LEUKEMIA AND PREGNANCY. (Fre.) Grozdea, J. (Unite de Recherches d'Immunologie et de Cytogenetique, INSERM U. 100, 31052 Toulouse, France); Colombies, P.; Kessous, A. *C R Soc Biol (Paris)* 169(5): 1376-1379; 1975.

Three pregnant women with chronic myeloid leukemia (CML) were clinically studied, both during pregnancy and immediately following birth, for Philadelphia chromosome (Ph^1) and for leukocyte alkaline phosphatase (LAP). The elevated LAP levels (representative of the acuteness of the disease) supported the hypothesis that pregnancy aggravates CML. As one patient with the most severe symptoms and highest LAP levels had the lowest percentage of Ph^1 clones (11% as opposed to 72% and 81%), the percentage of Ph^1 chromosome may play a role in the acuteness of the disease.

0998 SPLENIC LYMPHOID TISSUE IN HODGKIN'S DISEASE. (Fre.) Diebold, J. (Hotel Dieux de Paris, 1, place du Parvis Notre-Dame, 75181 Paris Cedex 04, France); Camilleri, J.-P.; Tricot, G. *Sem Hop Paris* 50(42): 2589-2597; 1974.

Histological, morphological, and immunofluorescent studies of splenic tissue taken from 100 patients with Hodgkin's disease (50 tissues with Hodgkin's lesions and 50 without) showed that the number of splenic corpuscles in the tissue with lesions was less than that in the unaffected tissue. This difference is indicative of the progressive atrophy of the lymphoid tissue, which occurs in the course of the disease. The spleens without lesions had active corpuscles in 75% of the cases and a large number of immunosecretory cells. The number of cells containing immunoglobulins was usually dependent on the type of histological function, the relative volume of splenic corpuscles, the splenic weight in the absence of a tumor, and whether the disease actually affected the spleen. When Hodgkin's disease does not affect the spleen, the lymphoid tissue retains its activity.

0999 RECEPTOR STUDIES ON 19 CASES OF NON-HODGKIN MALIGNANT LYMPHOCYTIC LYMPHOMA. (Eng.) Stuart, A. E. (Univ. Edinburgh Medical Sch., Edinburgh EH8 9AG, Scotland); Habeshaw*, J. A. *Acta Haematol* 55(3): 160-168; 1976.

Morphological and functional studies of cell surface receptors in 19 cases of non-Hodgkin malignant lymphoma were correlated. In nodular lymphomas, the values commonly fell within normal limits. In two cases, the nodules separated from the paranodular tissue contained a proportion of SRBC-rosetting cells as well as fluorescent cells. The diffuse lymphomas showed predominance of fluorescent cells but some contained numerous B and T cells. These represented ''co-operative'' neoplasms. In three cases, a receptor profile characterized by a high frequency of surface fluorescence and a low incidence of immunoglobulin G and RBC-antibody-complement receptors was noted; this may represent a pattern for a new subclass of malignant lymphoma. Tumor cells rich in surface fluorescence contained abundant ribosomes. Receptor silence was noted only in a single case.

1000 ADULT COELIAC DISEASE: A CASE WITH ULCERATION, DERMATITIS HERPETIFORMIS AND RETICULOSARCOMA. (Eng.) Toender, M. (Dept. Surgery, Univ. Tromso, Tromso, Norway); Soerlie, D.; Kearney, M. S. *Scand J Gastroenterol* 11(1): 107-111; 1976.

The case report of a 64-yr-old woman with adult celiac disease, recurrent ulceration and perforation of the small intestine, dermatitis herpetiformis, and an ileal reticulosarcoma is presented. The patient had celiac disease for a least 5 yr before she developed the other problems. She had been treated with a gluten-free diet (which she did not maintain) and Prednisone. The latter may have caused the first perforation, but the authors feel that the perforations developed as a complication of celiac disease, together with villous atrophy and chronic inflammatory changes in the mucosa.

1001 MALIGNANT TUMORS DEVELOPING IN ULCERS, OSTEOMYELITIC FISTULAE AND SCARS. (Rus.) Dryzhak, V. I. (Rovno Region Oncological Dispensary, Rovno, USSR). *Klin Khir* (10): 78-79; 1975.

Formation of skin cancer was observed in 18 patients, 10 male and 8 female, aged 46 to 77 yr. In 7 patients the tumor originated from wounds and burns; in 4, from lupus-type scars; in 3, from osteomyelitic fistulae; in 2, from ulcers; in 2, from atheroma. The cancer was localized on the face, on the upper or lower limbs, and on the trunk. The latent period ranged from 6 mo to 42 yr, and was longest in patients with lupus and osteomyelitis. In most patients the disease had been neglected; seven patients had metastases in the regional lymph nodes. Treatment varied, depending on location and spreading of the tumor and on age of the patient. Thirteen patients had surgery, followed, in six patients, by X-ray treatment. Three out of five irradiated patients died from metastases within 3 yr. Patients receiving radiation treatment were followed for 11 yr; no recurrences or metastasis occurred. Among the surgery patients, eight were alive after 5 yr or more, with no recurrences or metastasis; four died from generalized cancer 2-4 yr after the operation.

1002 THE ULTRASTRUCTURE OF OSTEOSARCOMA: A REVIEW OF TWENTY CASES. (Eng.) Williams, A. H. (Los Angeles County-U.S.C. Medical Center, 1200 No. State St., Los Angeles, CA 90033); Schwinn, C. P.; Parker, J. W. *Cancer* 37(3): 1293-1301; 1976.

The ultrastructural features of 20 cases of osteosarcoma are discussed. The malignant cells (osteoblasts) characteristically contained large quantities of dilated, anastomosing rough endoplasmic reticulum, often forming large lakes. Mitochondria were sparse. Marked ultrastructural similarities of cells from chondrosarcomatous, fibrosarcomatous, and typical osteosarcomatous areas of these tumors strongly supports the concept that these neoplastic cells all arise from the same progenitor cell. Malignant giant cells were readily differentiated from benign osteoclasts. The most significant ultrastructural findings were the varying degrees of calcification in the intercellular areas (osteoid), ranging from an extensive dense deposition of hydroxyapatite crystals that obscured the underlying collagen fibers, to focal collections, or puffs, of slender needle-shaped hydroxyapatite crystals deposited on or along collagen fibers. The earliest apparent evidence of calcification was the presence of small electron-dense particles on or in collagen fibers.

1003 BONE MARROW NECROSIS. (Eng.) Kiraly, J. F. (Univ. Virginia Sch. Medicine, Charlottesville, VA 22901); Wheby*, M. S. *Am J Med* 60(3): 361-368; 1976.

The clinical findings of bone marrow necrosis in 13 patients undergoing examination for peripheral blood cytopenia or leukoerythroblastic blood smear were reviewed and compared to those in the literature. Excluding sickle cell disease, all cases of bone marrow necrosis diagnosed during life were associated with a neoplastic process involving the marrow. A myeloproliferative disorder was found in five patients, metastatic carcinoma in five patients, a lymphoma in two patients, and both a myeloproliferative disorder and metastatic carcinoma in one patient. Necrosis involved the marrow at multiple sites in a piecemeal fashion with necrotic and structurally intact areas adjacent to each other. Severe bone pain without roentgenographic abnormality was the major symptom in 85% of the patients. Marrow and fat emboli, hypercalcemia and peripheral blood cytopenias were identified as direct complications of marrow necrosis. The prognosis of patients with marrow necrosis secondary to neoplastic disease was found to be extremely poor with a median survival of less than 1 mo. However, one patient responded to antineoplastic chemotherapy and showed healing of the bone marrow.

1004 EOSINOPHILIC GRANULOMA: A CASE REPORT. (Eng.) Berk, O. (Gulhane Military Acad. Medicine, Ankara, Turkey); Atasagun, H. *Kanser* 5(1): 30-35; 1975.

A case report of a 22-yr-old man with eosinophilic granuloma, a rare benign disease characterized by single or multiple osteolytic lesions, is presented along with characteristics of this disorder. Eosinophilic granuloma most frequently occurs in children and young adults and may be found in any bone, but usually occurs in the skull, ribs, vertebrae, and long bones. No sex predilection has been established. Typical histologic appearance is that of histologic proliferation, eosinophilic polymorphonucleosis, giant cells, and adjacent areas of necrosis and hemorrhage. Eventually, fibrosis and ossification dominate. The lesions are soft, with the primary lesion usually beginning in the bone marrow and later eroding the cortex. The patient had a 3-yr history of pain and swelling in the right shoulder. An x-ray revealed deformity of the shoulder and lytic areas in the neck and glenoid region of the scapula. A biopsy from the right shoulder demonstrated infiltration of eosinophiles and histiocytes, diagnosed as eosinophilic granuloma. As this disorder may be confused, both radiologically and clinically, with other inflammatory and tumoral bone disease, e.g., osteomyelitis, Ewing's tumor, and tuberculosis of the bone, the uthors suggest that the diagnosis of eosinophilic granuloma be confirmed by the histologic appearance of the biopsy.

005 FAILURE OF PERMANENT MARROW ABLATION TO INDUCE A MYELOPROLIFERATIVE DISORDER IN RABBITS.

(Eng.) Adler, S. S. (Rush-Presbyterian-St. Luke's Medical Center, 1753 W. Congress Parkway, Chicago, IL 60612); Trobaugh, F. E., Jr.; Knospe, W. H. *Biomed Express* 23(10): 403-405; 1975.

The long bones (i.e. femora, tibiae, humeri, and in some cases radii and ulnae) of 25 rabbits were flushed and curetted in order to investigate the possibility that myeloproliferation with extramedullary hemopoiesis is induced following mechanical marrow ablation. The marrow cavities were plugged with bone wax to prevent marrow regeneration permanently. Serial blood evaluations were performed, and upon death or sacrifice autopsies were performed. None of the animals had any sign of a myeloproliferative disorder up to 1 yr later, as judged by leukocytosis, peripheral blood morphology, and organ examination for extramedullary hemopoiesis. It is concluded that marrow destruction in rabbits per se is not sufficient to incite a myeloproliferative disorder, and that there is enough marrow reserve in rabbits to compensate for ablation of 25-40% of their marrow without expansion into parenchymatous organs.

1006 AN ABNORMAL RATIO OF CYTOCHROMES IN THE RESPIRATORY CHAIN OF MOUSE AND HUMAN MYELOMAS.

(Eng.) Sato, N. (Osaka Univ. Medical Sch., 33 Joancho, Kitaku, Osaka 530, Japan); Hagihara, B.; Kamada, T.; Abe, H.; Senoh, H.; Kitagawa, M. *Biochim Biophys Acta* 423(3): 557-572; 1976.

The transmissible mouse myeloma X5563 and a human myeloma from a 60-yr-old man who died of multiple myeloma were studied for cytochrome composition. Mouse myeloma cells and mitochondria had the same kind of cytochrome components in the respiratory chain as the normal ones. Their constitution, however, was abnormally different from that found in normal cells and mitochondria. The cytochrome aa$_3$ concentration was especially low in the myeloma as compared with cytochrome c concentration, and the resulting cytochrome aa$_3$/c ratio was 0.25, the lowest ever reported in animal mitochondria. Normal lymph node cells, producing the immunoglobulin similar to the myeloma cells, had a ratio of 1.1. Human myeloma mitochondria had the same characteristics as the mouse myeloma. Ascites form myeloma derived from mouse solid form myeloma grew faster, and yet aa$_3$/c ratio in the ascites myeloma clls was larger than that of solid form myeloma. The ratio aa$_3$/c of 0.5 in the ascites myeloma was found to be quite similar to that observed in various ascites tumor cells such as hepatomas, Ehrlich and sarcoma 180. A significant part of the cytochromes in the respiratory chain of the mouse myeloma remained in the oxidized form in the cyanide-inhibited or anaerobic states, and was reduced only by the addition of dithionite.

1007 SPREAD AND METASTASIS OF LEWIS' CARCINOMA OF THE LUNG AS A FUNCTION OF THE ROUTE OF ADMINISTRATION. PHARMACOLOGICAL STUDY OF A PRODUCT.

(Fre.) Carpentier, Y. (Institut Mario Negri, Milan, Italy). *C R Soc Biol (Paris)* 169(4): 1021-1028; 1973.

The various carcinogenic effects, on C57BL/6 mice, of the transplantation of Lewis Lung Carcinoma (LLC) by different pathways were studied. Injection in the tail vein induces pulmonary tumors; results increased with dosage. Intrahepatic injection was followed by unilobular hepatic tumors and by some early metastatic pulmonary tumors. Injection in the portal vein resulted in tumors distributed throughout the liver and pulmonary metastases. A localized tumor and pulmonary metastases followed im injection in the left hind leg. Treatment with sulfadiazine triazene had little effect on the primary tumors but greatly diminished the number of metastases.

1008 STUDY OF THE GROWTH OF A MAMMARY CANCER AND ONE OF ITS PULMONARY METASTASES.

(Fre.) Gros, C. M. (Service Central de Radiologie, Centre Hospitalo-Universitaire, F 67005 Strasbourg Cedex, France); Grunenwald, J. M. *J Radiol Electrol Med Nucl* 56(12): 891-893; 1975.

The doubling time of a primary breast cancer in a 48-yr-old woman was 72 days, while that of one of its pulmonary metastases progressing simultaneously was 20 days. The doubling time of a tumor is a function of the proportion and proliferation of each of its constituents, particularly the fibrous stroma. The kinetic differences among the various locia of a tumor may be due to the varying proportions of cancer cells and fibrous tissue present in primary and metastatic tumors. The locale, structure, hormonal levels, and immunological capacity are the factors that influence the kinetics.

1009 PLASMA FSH AND LH IN POST-MENOPAUSAL WOMEN WITH BREAST CANCER.

(Eng.) Wang, D. Y. (Imperial Cancer Res. Fund, Lincoln's Inn Fields, London, WC2A 3PX, England); Goodwin, P. R.; Bulbrook, R. D.; Hayward, J. L. *Eur J Cancer* 12(4): 305-311; 1976.

Follicle stimulating hormone (FSH) and luteinizing hormone (LH) were measured in the plasma of 40 normal postmenopausal women, 100 patients with early breast cancer (49 before and 51 after mastectomy), and in 26 women with advanced breast cancer. The mean levels of plasma FSH or LH in women with early breast cancer were the same as those found in normal women. There was no alteration in this mean level associated with mastectomy. In women with advanced breast cancer, the mean LH level was the same as in normal subjects, although the mean FSH concentration was statistically subnormal. This difference was probably due to the hormonal treatment that most of these patients were receiving. Plasma FSH or LH measured at the time of recurrence of the disease showed no differences from those determined shortly after mastectomy. Patients with early breast cancer with low FSH or LH, measured either before or after mastectomy, had a faster recurrence rate than patients with high plasma gonadotrophin levels. However, these differences were not statistically significant.

1010 BREAST CANCER AND PRECEDING CLINICAL BENIGN BREAST DISORDERS. A CHANCE ASSOCIATION. (Eng.) Devitt, J. E. (Ottawa Civic Hosp., Univ. Ottawa, Ottawa, Ontario K1Y 4E9, Canada). *Lancet* 1(7963): 793-795; 1976.

A review of 1,059 patients seen between 1970 and 1975 for breast disorders revealed that patients with clinically benign disorders were six times as numerous as those with breast cancer. Only 11% of patients with breast cancer had had a previous benign breast-biopsy specimen, and they were an average of 20 yr older than the peak age for benign clinical disease. Of the 163 patients with a previous benign breast-biopsy specimen, only 14 (9%) had breast cancer, compared with 13% in women without such a history. It is concluded that clinical benign breast disorders do not predispose patients to cancer, and such women should not be singled out for special study.

1011 CYSTOSARCOMA PHYLLOIDES METASTATIC TO A BRENNER TUMOR OF THE OVARY. (Eng.) Hines, J. R. (Northwestern Univ. Medical Sch., 251 E. Chicago Ave., Suite 728, Chicago, IL 60611); Gordon, R. T.; Widger, C.; Kolb, T. *Arch Surg* 111(3): 299-300; 1976.

A 53-yr-old woman had a 1-yr history of a mass in the right breast. Examination showed a large, nonfixed, multinodular mass in the right breast without axillary adenopathy. Pelvic examination demonstrated a uterine mass. Chest roentgenogram and bone scan showed a left sixth rib lesion. Breast biopsy showed cystosarcoma phylloides and a simple mastectomy was performed. One mo later the patient complained of abdominal distension and pain in the right thigh. The pelvic tumor had grown rapidly. Bone scan showed increased uptake in the left sixth and ninth ribs, and in the right femur. An ovarian tumor 15 cm in diameter was removed; the tumor had two parts. The hard portion was metastatic cystosarcoma phylloides and the soft portion was a Brenner tumor. Needle biopsy of the rib showed metastatic cystosarcoma phylloides. She was given radiation therapy for the femur and chest. One mo later the patient was readmitted with severe bone pain. Combination chemotherapy (cyclophosphamide, vincristine sulfate, and dactinomycin) was begun; she died of widespread metastatic disease 1 mo later. About 20% of cystosarcoma phylloides tumors are histologically malignant; 10% of patients with 'benign' cystosarcoma phylloides have recurrence. The treatment is simple mastectomy, or radical mastectomy if the pectoral muscles are involved; irradiation and chemotherapy are used if there are distant metastases. Brenner tumors are benign, non-functioning tumors found in the 40- to 70-yr age group.

1012 HISTOPATHOLOGIC SPECTRUM OF VAGINAL ADENOSIS AND RELATED CHANGES IN STILBESTROL-EXPOSED FEMALES. (Eng.) Hart, W. R. (Univ. Michigan Medical Sch., 1335 E. Catherine St., Ann Arbor, MI 48104); Townsend, D. E.; Aldrich, J. O.; Henderson, B. E.; Roy, M.; Benton, B. *Cancer* 37(2): 763-775; 1976.

A total of 98 colposcopically directed biopsies were obtained from the vagina, cervix, and cervicovaginal ridge (hood) of 80 young women believed to have had intrauterine exposure to stilbestrol (DES). The history of maternal stilbestrol administration was corroborated in 36 patients (45%), while in the remainder the drug history was regarded as presumptive. The findings did not differ significantly in those biopsies taken from patients with confirmed or presumptive histories. Histologic evidence of vaginal adenosis was detected in vaginal biopsies from 43 patients. In 30 cases (70%) benign Mullerian-type glandular epithelium was in the superficial vaginal wall, residing on the mucosal surface and/or in the lamina propria. The glandular epithelium was predominantly of endocervical type, but in six instances it resembled endometrial or fallopian tubal epithelium. The glands were accompanied by varying degrees of squamous metaplasia in 22 cases. Vaginal biopsies of adenosis from the other 13 patients (30%) revealed squamous metaplasia without demonstrable glands due to complete transformation of all antecedent glandular epithelium by squamous metaplasia. The results indicate that squamous metaplasia is a component of major importance in the natural history of adenosis and that the concept of adenosis should be broadened to include those examples comprised exclusively of metaplastic epithelium. In such examples metaplasia is identified by the immaturity and poor glycogenation of the squamous cells and their accompanying squamous pegs which often contain residual gland openings or squamous ''eddies.'' Similar findings were present in biopsies of seven cervicovaginal ridges and in cervical biopsies from 37 patients, except for the absence of endometrial or tubal type glands in the latter site. Although no adenocarcinomas were detected, six patients had squamous dysplasia of the vagina and/or cervix. In no case were premalignant or dysplastic changes of glandular cells found. The findings support the thesis that stilbestrol-associated adenosis represents anomalous embryologic localization of the original squamocolumnar junction in the vagina rather than in the cervix. It is closely related to so-called cervical ''erosions.'' The development of squamous metaplasia accounts for modifications in the clinical and histologic appearances by producing transformation zones which then may be subject to the same oncogenic stimuli for squamous neoplasia as are their counterparts in the cervix.

1013 BENIGN LIVER CELL ADENOMA ASSOCIATED WITH USE OF ORAL CONTRACEPTIVE AGENTS.

(Eng.) Baek, S.-M. (Mount Sinai Sch. Medicine City Univ. New York, New York, NY); Sloane, C. E.; Futterman, S. C. *Ann Surg* 183(3): 239-242; 1976.

A benign hepatic adenoma in a 31-yr-old woman who had been taking oral contraceptives (Ortho Novum, 2 mg) for seven years is reported. The diagnosis must be suspected in any young woman taking oral contraceptive agents who develops signs and symptoms of acute cholechystitis with hepatomegaly or mass, or when signs and symptoms of nontraumatic intraabdominal hemorrhage are present. Rupture of the tumor is a life-threatening complication. Treatment should be either hepatic lobectomy or wide local resection.

1014 NEOVASCULARIZATION INDUCED BY INTRAOCULAR XENOGRAFTS OF NORMAL, PRENEOPLASTIC, AND NEOPLASTIC MOUSE MAMMARY TISSUES.

(Eng.) Gimbrone, M. A., Jr. (Natl. Cancer Inst., U.S. Dept. Health, Education and Welfare, Bethesda, MD 20014); Gullino, P. M. *J Natl Cancer Inst* 56(2): 805-818; 1976.

The capacity to induce neovascularization was compared in normal, preneoplastic, and neoplastic mouse mammary tumors from strains with a high incidence of tumors (C3H, C3H-Avy, C3H-AvyfB) by implantation of small biopsy fragments on the iris surface in New Zealand White rabbits. Proliferation of iris blood vessels was studied by: 1) direct, in vivo slit-lamp stereomicroscopy and fluorescein angiography; 2) filling of the microvasculature with colloidal carbon; and 3) histologic examination. The microscopic anatomy of biopsy samples of normal mammary glands varied with the breeding history of the donor. Ninety percent of mammary tumor implants elicited iris neovascularization after 48-72 hours, regardless of their histologic classification or the presence or absence of mammary tumor virus. Corticosteroid treatment reduced immediate postoperative inflammation (12-36 hr) but did not abolish subsequent growth of new vessels. Necrotic tumor fragments failed to elicit any neovascular response. In contrast, only 6% of normal tissues from resting mammary glands caused any vasoproliferation. Hormone-stimulated mammary tissues from pregnant and lactating mice exhibited a transient neovascular capacity that was lost during postweaning involution. Of the implants from premalignant hyperplastic alveolar nodules (HAN's), 30% produced a pattern of vessel growth similar to that of tumor implants. D-1 line (HAN outgrowth) tissues, which have a predicted low incidence of tumors, induced significantly fewer neovascular responses than morphologically and biochemically similar D-2 line tissues, which have a predicted high incidence of tumors. These data suggest that the capacity to induce neovascularization is acquired during malignant progression of mouse mammary tissues; therefore, demonstration of this property may be useful in the identification of those intermediate cell populations most at risk for neoplastic transformation.

1015 PHEOCHROMOCYTOMA AND PREGNANCY. (Fre.)

De Grandi, P. (Hopital Cantonal, Basel, Switzerland); Cornu, P.; Ziegler, W. H.; Enderlin, F. *J Gynecol Obstet Biol Reprod (Paris)* 4(5): 709-720; 1975.

A case history of a 24-yr-old pregnant woman is presented. During the course of her pregnancy she developed arterial hypertension, which led to a premature delivery. Tests revealed pheochromocytoma of the right suprarenal. It was removed surgically and the symptoms vanished. The authors review the essential aspects of a differential diagnosis of arterial hypertension in pregnancy and, from a survey of the literature, point out the high fetal and maternal mortality rates associated with pheochromocytoma. It is suggested that the tumor be treated surgically in the first trimester and the pregnancy conserved. In the second trimester, if the condition can be stabilized the tumor should wait until the fetus is viable; if the condition cannot be stabilized the tumor should be treated surgically even though the operation generally involves evacuation of the uterus. If the fetus is viable, a caesarean is recommended, and the tumor should be removed immediately or within a few weeks. The induction of delivery is not recommended.

1016 DIAGNOSTIC AND THERAPEUTIC PROBLEMS IN 10 CASES OF PHEOCHROMOCYTOMA. (Eng.)

Dimopoulos, C. A. (10 Rue Neoph, Douca, Athens 1138, Greece); Scouteris, M.; Hatziconstantinou, B.; Polyzos, L.; Daicos, G. *Eur Urol* 1(3): 145-150; 1975.

Ten cases of pheochromocytoma, of which eight were benign and two malignant, were considered. All patients presented with hypertension, either paroxysmal (seven cases) or permanent (three cases). It is essential to emphasize that the initial symptomology of these patients on their admission to the hospital was often atypical and misleading: in two cases, the symptomology was urological, in two cases psychiatric and in one digestive. Quantitative determination of catecholamines and their metabolites was positive in seven cases out of ten. Retropneumoperitoneal insufflation combined with intravenous urography and tomographies provided valuable information in each case. The surgical removal of these tumors, which was unilateral and in normal position in each case, was carried out without complications. Sudden blood pressure variations observed during the operation could be controlled without difficulty. In six patients, the blood pressure became normal and remained so for four years. In two other patients, the blood pressure came back to normal after the operation, but presented a slight increase one year later. Pheochromocytomas, which are often masked by a misleading symptomatology, must be systematically searched for in all hypertensive patients despite the characteristics of the hypertension. Surgical removal, if done early enough, produces cure of the hypertension.

1017 PROLACTIN ADENOMAS; A MORPHOLOGICAL STUDY. CORRELATIONS BETWEEN CLINICAL AND ANATOMICAL DATA IN 91 CASES. (Fre.) Peillon, F. (Faculte de Medecine Pitie-Salpetriere, 105, Boulevard de l'Hopital, F 75634 Paris Cedex 13, France); Racadot, J.; Olivier, L.; Racadot, O.; Vila-Porcile, E. *Ann Endocrinol (Paris)* 36(59): 277-278; 1975.

Light microscopy was used to study 91 prolactin cell adenomas, 76 in women and 15 in men. Their structure was very similar, with active secretion in all. The clinical and anatomical data were correlated as follows: there was a frequency of hemorrhagic areas in cases with estroprogesterative treatment (49/61), and clinically invasive tumors showed histological signs of proliferation (26/32 cases with mitoses, polyploidy, and multinucleated cells). There was no correlation between the appearance of erythrosinophilic granules and galactorrhea. In 16 cases of galactorrhea, although the cells were secreting, granules were not evident. An additional 25 cases in which galactorrhea was not present were studied by electron microscopy. Microscopic and submicroscopic secretory granules were found in all, along with a defect of the parenchymal basal lamina.

1018 LOCALIZATION OF PROLACTIN IN CHROMOPHOBE PITUITARY ADENOMAS: STUDY OF HUMAN NECROPSY MATERIAL BY IMMUNOPEROXIDASE TECHNIQUE. (Eng.) Kovacs, K. (St. Michael's Hosp., Toronto, Ontario, Canada): Corenblum, B.; Sirek, A.M.T.; Penz, G.; Ezrin, C. *J Clin Pathol* 29(3): 250-258; 1976.

In order to identify prolactin-producing tumors in human pituitary glands, 45 chromophobe adenomas obtained from unselected necropsies were studied by various staining procedures including the immunoperoxidase technique. The presence of immunoreactive prolactin was revealed in the cytoplasm of the tumor cells in six cases (13%), indicating that prolactin-producing adenomas are not rare. No correlations were established between tumors and clinical history. Two adenomas were detected in female patients and four were detected in male patients. The age of the patients at necropsy was 28-75 yr. Three adenomas were associated with disseminated carcinoma, two with fatal liver disease, and one with diabetes mellitus, atherosclerosis, and pyelonephritis. Manifest endocrine symptoms were not disclosed, and endocrine investigations, including measurements of blood prolactin levels, were not undertaken. Thus, direct evidence is lacking as to whether or not these tumors were actively secreting prolactin. In the nontumorous parts of the anterior lobes the number of prolactin cells was decreased in two cases, suggesting that prolactin released from the adenoma cells suppressed prolactin production in the nontumorous pituitary. However, the number of prolactin cells of the nontumorous adenohypophysis seemed to be unchanged in two and increased in another two cases. The present findings prove the existence of the prolactin-producing adenomas as a distinct entity. These tumors do not stain with acid or basic dyes, they are PAS or thionin negative, and they do not contain immunoreactive growth hormone. Thus, by conventional staining procedures they are indistinguishable from other chromophobe adenoma types. Herlant's erythrosin and Brookes' carmoisine methods, claimed specifically to stain prolactin cells, failed to provide reliable results; hence their use cannot be recommended in tumor identification. Immunoperoxidase staining of prolactin is the only technique that conclusively reveals the presence of immunoreactive prolactin in the cytoplasm of the tumor cells and permits diagnosis. It is proposed that this technique be introduced in pituitary morphological studies.

1019 POSTADRENALECTOMY PITUITARY ADENOMA (NELSON'S SYNDROME) IN CHILDHOOD: CLINICAL AND ROENTGENOLOGIC DETECTION. (Eng.) Young, L. W. (Children's Hosp. Pittsburgh, 125 De Soto St., Pittsburgh, PA 15213); Lim, G. H. K.; Forbes, G. B.; Bryson, M. F. *Am J Roentgenol* 126(3): 550-559; 1976.

Two cases of postadrenalectomy pituitary adenoma (in 8- and 12-yr-old girls) are presented, together with a review of the literature. It has been well established that following total adrenalectomy in Cushing's syndrome associated with adrenal hyperplasia, elements of the pituitary may be stimulated to grow rapidly and even aggressively. The fact that approximately half of reported cases and the case of the 8-yr-old girl showed minimal sellar enlargement even before adrenalectomy provides evidence of a preexisting tumor in many, if not all, cases. In the other half of reported cases and the 12-yr-old girl, who had normal sellar appearance prior to adrenalectomy, the tumor was probably too small to cause sellar enlargement. The predominate pituitary lesion is chromophobe adenoma. Nelson's syndrome has occurred secondarily only in those cases in which the adrenal lesion has been hyperplasia and not in those showing adenoma or carcinoma. Because isolated laboratory findings cannot always document a developing or enlarging ACTH secreting pituitary chromophobe adenoma, it is essential that all patients adrenalectomized because of Cushing's syndrome have (a) frequent clinical follow-up for the development of or the worsening of hyperpigmentation, (b) visual field examinations at corresponding intervals, and (c) roentgenological monitoring of the sella turcica at close intervals (every six months, or more often if tumor is suspected).

1020 CENTRIOLES AND CILIA IN NON-TUMOROUS ANTERIOR LOBES AND ADENOMAS OF THE HUMAN PITUITARY. (Eng.) Horvath, E. (Toronto General Hosp., Univ. Toronto, Ontario, Canada); Kovacs, K.; Ezrin, C. *Pathol Eur* 11(1): 81-86; 1976.

The centrioles and cilia were studied in 20 nontumorous and 55 adenomatous human pituitary glands by electron microscopy. Centrioles were identified in the granulated cells of the nontumorous gland, most commonly in the growth hormone and prolactin cells, as well as in sparsely granulated undifferentiated cells and gonadotrophs, thyrotrophs, and melanocorticotrophs. Centrioles associated with a cilium were most common in follicular cells, but occasionally occurred in granulated adenohypophysiocytes. The majority had the typical ultrastructural characteristics. Single or paired centrioles were also found in all types of pituitary adenomas, most commonly in sparsely granulated growth cell adenomas and in mixed tumors containing these cells and prolactin cells. In three tumors, procentriolar bodies, suggesting the transformation of mitochondria into centrioles, were found and in two other cases, rudimentary cilia with abnormal features occurred. The results indicate that centrioles and cilia can be found in nontumorous adenohypophysiocytes and various pituitary adenomas.

1021 ULTRASTRUCTURAL ASPECTS OF THE HUMAN THYROID CELL IN DIFFERENT PATHOLOGICAL CONDITIONS. (Fre.) Ketelbant-Balasse, P. (Laboratoire d'Anatomie Pathologique, Universite Libre de Bruxelles, 97, rue aux Laines, 1000 Brussels, Belgium); Neve, P. *Ann Endocrinol (Paris)* 36(6): 373-374; 1975.

Lysosomal accumulation with lipofuscin granules is characteristic of a chronically stimulated thyroid and probably represents a premature ageing of the cells; the observed mitochondrial accumulation appears to be independent of lysosome modification. In these cases, thyroid secretion might proceed by a mechanism different from an initial phagocytosis of colloid droplets. The fibrillar transformation of oncocytes in thyroiditis, myxedema, and Hurthle cell adenoma probably corresponds to a terminal state. Lysosome accumulation in Hurthle cell adenoma appears to be an accidental occurrence.

1022 PITUITARY-THYROID FUNCTION IN TROPHOBLASTIC DISEASE. (Eng.) Miyai, K. (Osaka Univ. Medical Sch., Osaka, Japan); Tanizawa, O.; Yamamoto, T.; Azukizawa, M.; Kawai, Y.; Noguchi, M.; Ishibashi, K.; Kumahara, Y. *J Clin Endocrinol Metab* 42(2): 254-259; 1976.

The serum concentrations of total free triiodothyronine (T_3) and thyroxine (T_4), and pituitary thyrotropin (TSH) in response to thyrotropin-releasing hormone (TRH) administration and to thyroid-stimulating activity, were assessed by bioassay to elucidate the relation between these parameters in patients with trophoblastic disease (before and after treatment). Pituitary-thyroid function was assessed in 12 patients with trophoblastic disease (4 hydatidiform mole, 3 invasive mole, and 5 choriocarcinoma). Thyroid-stimulating activity was detectable, by means of the McKenzie bioassay, in 6 patients (group 1) but not in the other 6 patients (group 2). In group 1, serum TSH determined by radioimmunoassay was mostly undetectable and did not respond to the administration of TRH, while in group 2, basal TSH was detectable in half of the patients and responded to TRH in all cases. Serum concentrations of total T_4 (18.7 ± 2.0 µg/100 ml), free T_4 (4.9 ± 0.04 ng/100 ml), total T_3 (352 ± ng/100 ml), and free T_3 (0.57 ± 0.11 ng/100 ml) in group 1 were statistically greater than those in group 2 (total T_4, 9.2 ± 1.0 µg/100 ml; free T_4, 2.0 ± ng/100 ml; total T_3, 156 ± 20 ng/100 ml; and free T_3 0.23 ± 0.03 ng/100 ml). Free T_4 and T_3 fractions were within normal limits in both groups. After treatment of 5 patients in group 1, the thyroid stimulating activity determined by bioassay dropped to undetectable levels, the serum concentrations of thyroid hormones decreased to normal limits, and TSH response to TRH became positive. These findings indicate that an abnormal thyroid stimulator, derived from the trophoblastic tissue, stimulated the thyroid hormone secretion from the thyroid gland and in turn suppressed TSH response to TRH in some patients with trophoblastic disease.

1023 MEIBOMIAN GLAND CARCINOMA: REPORT OF A CASE WITH ELECTRON MICROSCOPIC FINDINGS. (Eng.) Weigent, C. E. (Dept. Lab. Medicine and Pathology, Univ. Minnesota, Minneapolis, MN); Staley, N. A. *Hum Pathol* 7(2): 231-234; 1976.

The case report of a 70-yr-old man with carcinoma of the meibomian gland is presented together with the electron microscopic findings. The painless nodule had been incised and drained on three occasions but continued to enlarge. The presence of epidermoid features, including microvilli and numerous desmosomes and large tonofibrils, in the tumor cells suggested that the tumor arose from sebaceous duct cells rather than from cells composing the sebaceous glands.

1024 ISONUCLEOLINOSIS IN CELL CULTURES OF HUMAN MENINGIOMAS. (Eng.) Zanki, H. (Dept. Human Genetics, Univ. Saarland, 665 Homburg, W. Germany); Love, R. *Cancer Res* 36(3): 1074-1076; 1976.

In cell cultures of 13 human meningiomas the internal structure of the nucleolus was stained by the toluidine blue-molybdate method and compared with the karyotype of the tumors. Although some of the meningiomas had lost or gained one or more chromosomes and had undergone structural aberrations, all showed isonucleolinosis, which is normally found only in cells with normal karyotype. The results suggest that the occurrence of iso- or anisonucleolinosis may not be a specific sign of euploidy or aneuploidy, but of benignity or malignancy of the examined tissue.

1025 THE RELATIONSHIP OF POLYAMINES IN CEREBROSPINAL FLUID TO THE PRESENCE OF CENTRAL NERVOUS SYSTEM TUMORS. (Eng.) Marton, L. J.

(Dept. Neurological Surgery, Univ. California, San Francisco, CA 94143); Heby, O.; Levin, V. A.; Lubich, W. P.; Crafts, D.C.; Wilson, C. B. *Cancer Res* 36(3): 973-977; 1976.

Cerebrospinal fluid (CSF) polyamine (putrescine, spermidine, and spermine) concentrations were assayed in patients with and without CNS tumors using a high-pressure liquid chromatographic technique. Definite elevations were found in the CSF polyamine concentrations of patients with untreated malignant CNS tumors when compared with those concentrations observed in the CSF of patients without neoplasia. Patients undergoing successful tumor therapy for malignant CNS tumors showed CSF polyamine concentrations that closely approximated the concentrations found in the CSF of patients without tumor. The authors conclude that CSF polyamine concentrations are not merely reflective of alterations in the blood brain barrier and that these polyamine values may be a quantitative relation to tumor burden.

1026 ADULT NEUROBLASTOMA. ELECTRON MICROSCOPIC OBSERVATIONS IN NINE CASES. (Eng.) Mackay, B. (Texas Medical Center, Houston, TX 77025); Luna, M. A.; Butler, J. J. *Cancer* 37(3): 1334-1351; 1976.

The case reports of nine patients, aged 18-72 yr, with neuroblastoma are presented. The patients had small round cell neoplasms that were found on electron microscopy to have the ultrastructural features of neuroblastoma. The primary tumor was retroperitoneal in one patient. In another, liver and bone metastases were present and the primary site was not determined. The tumor presented in a peripheral location in the remaining seven patients (leg in two, buttock in one, head and neck in four), and all seven tumors metastasized to regional lymph nodes. One tumor that arose in the nasal cavity displayed olfactory differentiation. Two tumors recurred locally following excision. Although two patients had died from disseminated disease, the prognosis appears more favorable than in childhood neuroblastoma. Adequate local excision of a peripheral lesion with close follow-up are indicated.

1027 PROLIFERATIVE ARTERIOPATHY IN MACAQUES AND VASCULAR NEUROFIBROMATOSIS (Letter to Editor). (Eng.) Beach, J. E. (Pharmaceutical Division, Fisons Ltd., Bakewell Road, Loughborough, Leicestershire, England); Pirani, C. L. *Exp Mol Pathol* 24(1): 126-127; 1976.

The differences between proliferative arteriopathy (PA) and vascular neurofibromatosis (VN) were summarized. The thickening of the arterial wall in VN comprises mainly intimal proliferation with an increase in amorphous ground substance resembling mucopolysaccharide and containing nodules of fusiform cells, whereas thickenings in PA consist entirely of proliferating cells, usually with no increase in ground substance. The proliferation of fibrous tissue in the adventitia often seen in VN is not seen in PA. VN shows diversity of types of arterial lesion, often side by side in the same piece of tissue, which is not seen in PA where all the lesions in any individual case are similar. VN usually affects the main renal artery and its branches, whereas PA is restricted to intraparenchymal vessels. Sequelae, such as stenosis, thrombosis, aneurysm, and hypertension are common in VN but never occur in PA. The origin of proliferating cells in both conditions is uncertain, however, electron photomicrographs suggest a smooth muscle origin for VN. Serial sections of PA lesions suggest an endothelial origin. In all cases of PA described, neurofibromatosis was never diagnosed, nor has the generalized form of the disease, as far as known, been recognized in macaques.

1028 EXFOLIATIVE CYTOLOGY OF THE COLON. (Fre.) Cabre-Fiol, V. (Hopital de la Santa Cruz y San Pablo, Barcelona 13, Spain); Aran-Suau, J.; Pujol-Pi, J.; Germa, J. R.; Vilardell, F. *Ann Gastroenterol Hepatol* 11(3): 235-243; 1975.

The authors discuss the different techniques utilized for cytology of the colon and the value of endoscopic cytology compared to biopsy and x-ray examination. Exfoliative cytology was positive in 86.9% of the 34 cancer patients studied and biopsy was positive in 92.6%. In only one case did cytology confirm a diagnosis that biopsy had shown to be negative. Endoscopy and x-radiation gave inferior results from a diagnostic point of view. Endoscopic cytology has also been useful in evaluating the activity of colorectal hemorrhages and Crohn's disease. It is concluded that exfoliative cytology could be useful in a laboratory with the properly trained personnel, but its value is otherwise limited.

1029 USEFULNESS AND LIMITS OF DETECTABILITY OF CARCINOEMBRYONIC ANTIGEN (CEA) DURING THE POSTOPERATIVE FOLLOW-UP OF PATIENTS WITH CARCINOMAS OF THE COLON AND RECTUM. (Fre.) Jaeger, Ph. (Institut de biochimie de l'Universite, 21 rue du Bugnon, CH-1011 Lausanne, Switzerland); Pettavel, J.; Wuilleret, B.; Bertholet, M. M.; Mach, J.-P. *Schweiz Med Wochenschr* 105(46): 1533-1538; 1975.

The usefulness of carcinoembryonic antigen (CEA) radioassay as a means of determining tumor relapse was studied in 45 patients resected for cancer of the colon or rectum. After surgery the CEA levels dropped to normal (< 5 ng/ml) in 40 patients. The remaining five showed a subsequent increase in CEA levels, and later all had recurring tumors. The CEA levels in another group of 19 metastatic patients with only partial tumor resections increased after an initial decrease. Repeated CEA radioimmunoassay was performed on 22 of the first group of 45; 8 had CEA level increases which preceded clinical diagnosis of tumor relapse by 2-10 mo. Their case histories are given in brief. These esults show that relapses of colic and rectal ancer can be detected by increased CEA levels onths before the appearance of clinical evidence.

30 SPONTANEOUS COLON TUMORS IN RATS. (Eng.) Miwa, M. (Inst. Medical Science, Univ. okyo, Minatu-ku, Tokyo, Japan); Takenaka, S.; Ito, .; Fujiwara, K.; Kogure, K.; Tokunaga, A.; Hozumi, .; Fujimara, S.; Sugimura, T. *J Natl Cancer Inst* 6(3): 615-621; 1976.

wenty-eight cases of spontaneous colon tumors ere found during autopsy of 3087 male W rats over 6-yr period. The tumors were multiple and localzed in the proximal part of the colon. Many nodles protruded on the serosal surface; polypoid umors protruding into the lumen were rare. Microcopically, hyperplastic and adenomatous polyps ere observed in the mucous membrane of the colon. here was adenomatous downward growth into the ubmucosal layer, and tubular-type adenocarcinomas nvaded all the coats of the colon wall. Structural typism was frequent, and slight cell atypism was lso present. Invasive tumors sometimes had an nflammatory reaction, and bacterial growth was bserved within the neoplastic glands in thioninetained sections. *Escherichia coli* and a gramegative, facultative anaerobic bacillus, which rew only with *E. coli* in vitro, were isolated. A ultured epithelial cell line was established from ne colon tumor. After a primary tumor was transplanted ip into young adult rats, a mass grew in he peritoneal cavity for 4 mo. There were three ursts of tumor occurrence during the 6 yr; the verage incidence was 1%.

1031 AN ULTRASTRUCTURAL APPLICATION OF SILVER METHENAMINE TO THE STUDY OF MUCIN CHANGES IN THE COLONIC MUCOSA ADJACENT TO AND REMOTE FROM CARCINOMA. (Eng.) Dawson, P. A. (Westminster Medical Sch., London, UK); Filipe, M. I. *Histochem J* 8(2): 143-158; 1976.

A periodic acid-chromic acid-silver methenamine technique for visualizing glycoproteins at the ultrastructural level was applied to colonic mucosa taken from areas adjacent to and remote from carcinoma. Control mucosa was obtained by biopsy of patients with no known gastrointestinal disease. Non-oxidized control sections were run in parallel. Quantitative and qualitative differences in glycoproteins were detected in the mucosa adjacent to carcinoma as compared with the normal. Furthermore, the vesicles in both the ''intermediate'' and absorptive cells elaborated a glycoprotein product and a direct relationship probably exists between the increased vesiculation and the markedly developed ''fuzzy coat'' in the mucosa adjacent to the tumor. It is suggested that these findings may represent a feature of an early stage of carcinogenesis. Histochemical and ultrastructural techniques of the kind used in this study may thus be of value in identifying or predicting malignancy in the colonic epithelium.

1032 CROHN'S DISEASE, COLITIS, OR CANCER. (Eng.) Peterson, R. F. (Scott and White Clinic, Temple, TX 76501). *Tex Med* 72(4): 76-79; 1976.

The gross and microscopic features of Crohn's disease and ulcerative colitis are reviewed, with attention to differential diagnosis of these conditions from each other and from other diseases. Crohn's disease causes thickening of the bowel wall, enlarged mesenteric nodes, bear-claw ulcers of the mucosa, and a cobblestone appearance of the mucosa. The terminal ileum and right side of the colon are involved most frequently, and the entire thickness of the bowel wall is involved. Ulcerative colitis, in contrast, primarily involves the mucosa, and shows more diffuse ulceration. Both diseases are predisposing to carcinoma of the colon. Carcinoma of the colon may be differentiated from Crohn's disease by the homogeneous appearance of the cut surface of the thickened bowel wall in the former and the accentuated muscle bundles in the latter. Ischemic colitis, pseudomembranous colitis, colitis cystica profunda, amebic ulcers, diverticulitis, and lymphogranuloma venereum, and several other forms of colitis may be mistaken for ulcerative colitis, Crohn's disease, or carcinoma.

1033 MENETRIER'S DISEASE AND ADENOCARCINOMA OF THE PANCREAS. (Eng.) Lightdale, C. J. (Memorial Sloan-Kettering Cancer Center, 1275 York Ave., New York, NY 10021); Bisordi, W. *Am J Gastroenterol* 64(6): 467-471; 1976.

The case of a patient with classical Menetrier's disease, who had adenocarcinoma of the pancreas as well, is presented. The 74-yr-old woman presented with abdominal pain and edema, and Menetrier's disease was diagnosed at surgical full thickness gastric wall biopsy. After 2 mo, she complained of increasing severe abdominal pain radiating to the back. Work-up showed classic Menetrier's disease with large gastric folds, achlorhydria, gastrointestinal protein loss, and hypoalbuminemia. A celiac arteriogram, however, suggested a pancreatic neoplasm, and adenocarcinoma of the body of the pancreas was confirmed at laparotomy. This is the first report of the concurrence of these two diseases. The difficulty of differentiating Menetrier's from occult gastrointestinal cancer is discussed.

1034 SCANNING ELECTRON-MICROSCOPIC STUDY OF THE SURFACE CHARACTERISTICS OF NEOPLASTIC ENDOTHELIAL CELLS OF BLOOD VESSELS. (Eng.) Toth, B. (Univ. Nebraska Medical Center, 42nd St. and Dewey Ave., Omaha, NB 68105); Malick, L. *J Pathol* 118(1): 59-63; 1976.

The morphological surface characteristics of neoplastic endothelial cells of blood vessels induced by po administration of 1,2-dimethylhydrazine dihydrochloride in Swiss mice were studied by scanning electron microscopy. The interconnecting vascular channels were lined by malignant endothelial cells which formed bridges, cord-like structures and had extended cytoplasmic processes which made the network more intricate. The endothelial cells were often in close approximation to each other and exhibited irregular growth patterns and orientation. The cell surface displayed a rugged, terrace-like microcontour of elevations, depressions, blebs and nodular structures. These findings correlate with the earlier morphological observation obtained by transmission electron microscopy.

1035 REGULATION OF THYROTROPIN (TSH) RELEASE AND PRODUCTION IN MONOLAYER CULTURES OF TRANSPLANTABLE TSH-PRODUCING MOUSE TUMORS. (Eng.) Eto, S. (Albert Einstein Coll. Medicine, 1300 Morris Park Ave., Bronx, NY 10461); Fleischer, N. *Endocrinology* 98(1): 114-122; 1976.

Thyrotropin (TSH) release and production were studied in short term monolayer cultures of transplantable, thyroid hormone responsive, TSH-producing mouse pituitary tumors. These tumors contained large amounts of TSH, small amounts of growth hormone (GH) and no detectable luteinizing hormone (LH). The TSH content per tumor cell was similar to that of the normal pituitary where thyrotrophs represent a small fraction of the total cells, suggesting that the TSH content per tumor cell was less than that of the normal thyrotroph. There was a time dependent release and production of TSH by tumor cells in monolayer culture. Thyrotropin-releasing hormone (TRH) increased the release into the media and the production of TSH in a dose dependent manner. Maximum effects were noted at 0.2 ng/ml. Thyroid hormones and somatostatin inhibited both basal and TRH-induced effects on both TSH release and production. TSH release as induced by TRH was calcium dependent. TSH release was stimulated by ouabain (10^{-3} M) and potassium (57 mM), agents known to promote cellular calcium uptake in a calcium-dependent manner. These studies indicate that tumor-derived cells function in monolayer culture in a similar fashion to normal thyrotrophs. N^6,O^{21} dibutyryl cAMP (16 mM) and theophylline (10 mM) increased TSH release suggesting that cAMP is involved in TSH release. TRH had no detectable effect on tumor cell adenylate cyclase activity or levels of cAMP. Prostaglandin E_1 (1-10 μg/ml) stimulated adenylate cyclase activity and elevated cellular levels of cAMP without increasing TSH release. cAMP may not be the intracellular mediator of TRH action.

1036 ROLE OF ADENOSINE DEAMINASE IN LYMPHOCYTE PROLIFERATION. (Eng.) Hovi, T. (Clinical Res. Center, Watford Road, Harrow, Middlesex, England); Smyth, J. F.; Allison, A. C.; Williams, S. C. *Clin Exp Immunol* 23(3): 395-403; 1976.

Activity of adenosine deaminase (ADA), an enzyme known to be deficient in some patients with severe combined immunodeficiency, increased three-fold within a 24-hr exposure of human peripheral blood lymphocytes to phytohemagglutinin (PHA) in culture. This increase took place before the onset of DNA synthesis. Increased levels of ADA activity were also observed in lymphocytes incubated with pokeweed mitogen (PWM) for 60 hr. DNA synthesis induced by PHA, PWM or mixed lymphocyte cultures (MLC) was strongly inhibited by adenosine at concentrations of 10^{-4} M or higher when human peripheral blood lymphocytes were cultured in a medium supplemented with horse serum, which lacks ADA. From 10^{-6} to 10^{-} M coformycin, a potent inhibitor of ADA, inhibited PHA-, PWM- and MLC-induced DNA synthesis to a variable extent, whereas thymidine incorporation induced by *Salmonella* lipopolysaccharide (LPS) in mouse spleen cell sultures was strongly inhibited (by 75% or more) by 10^{-6} M coformycin. Combination 10^{-7} to 10^{-8} M coformycin and 10^{-4} to 10^{-5} M adenosine synergistically inhibited mitogen- or MLC-induced DNA synthesis in human and mouse lymphocyte cultures. These results, together with observations of children with ADA deficiency, provide evidence that adenosine deaminase is highly important for lymphocyte proliferation. Human peripheral blood lymphocytes incubated with PHA, 10^{-5} M adenosine and 10^{-7} M coformycin showed some cytotoxicity, whereas the rate of ^{51}Cr release from normal lymphocytes was not modified by the drugs. These findings suggest that in vivo clones of lymphocytes responding to specific antigens might be eliminated by coformycin, which may prove to be useful as a specific immunosuppressive agent.

1037 PLASMA DOPAMINE-BETA HYDROXYLASE ACTIVITY IN PHAEOCHROMOCYTOMA. (Eng.) Stone, R. A. (Veterans Admin. Hosp., 3350 La Jolla Village Drive, San Diego, CA 92161); Lilley, J. J.; Golden, J. *Clin Endocrinol (Oxf)* 5(2): 181-185; 1976.

Plasma dopamine-beta-hydroxylase (DβH) activity, a marker of catecholamine secretion that occurs via exocytosis, was determined preoperatively in eight patients with pheochromocytoma. Despite very elevated urinary catecholamine concentrations, mean plasma DβH activity was 32.6 ± 3 U/l, and was not significantly different from apparently healthy subjects. Seven days after surgery, one subject exhibited a 60% postoperative decrease of enzyme activity. These results suggest that diffusion across plasma membranes is the predominant mechanism of catecholamine release from pheochromocytomas. The postoperative change in one patient suggests tumor heterogeneity and that exocytosis may contribute to the process of catecholamine release in some patients. Variations between these results and those of other studies can be explained by the different methods used to assay enzyme activity.

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1051 MYELOPOIETIC CELL PROLIFERATION IN GRANULOCYTOPENIA OF REFRACTORY ANAEMIA AND PRELEUKAEMIC STATES WITH HYPER-PLASTIC BONE MARROW. (Eng.) Fischer, M. (Universitaetsklinik, Zentrum fuer Innere Medizin, Haematologische Abteilung, Theodor-Stern-Kai 7, 6000 Frankfurt a.M. 70, W. Germany); Mitrou, P. S.; Huebner, K. *Klin Wochenschr* 54(5): 211-216; 1976.

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1053 OXYMETHOLONE TREATMENT IN AREGENERATIVE ANAEMIA. II. REMISSION AND SURVIVAL -- A PROSPECTIVE STUDY. (Eng.) Hast, R. (Div. Haematology, Karolinska Hosp., Stockholm, Sweden); Skarberg, K. O.; Engstedt, L.; Jameson, S.; Killander, A.; Lundh, B.; Reizenstein, P.; Uden, A. M.; Wadman, B. *Scand J Haematol* 16(2): 90-100; 1976.

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1057 SOLID OVARIAN TERATOMA WITH PERITONEAL AND ABDOMINAL WALL IMPLANTS, PROGRESSIVE IN VIVO MATURATION, AND PROBABLE CURE. (Eng.) Benjamin, F. (Queens Hosp. Center Affiliate of the Long Island Jewish-Hillside Medical Center, Jamaica, NY); Rorat, E. *Gynecol Oncol* 3(4): 308-313; 1975.

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1059 TRANSPLANTATION OF MYELOGENOUS LEUKEMIC CELLS WITH THE PHILADELPHIA (PH^1) CHROMOSOME (Proceedings Abstract). (Eng.) Lozzio, B. B. (Univ. Tennessee Memorial Res. Center, Center Health Sciences, Knoxville, TN 37920); Lozzio, C. B.; Machado, E. A.; Kim, J. *IRCS Med Sci (Suppl)* 3(10): 16; 1975.

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ltimore)* 20(1): 26-31; 1976.

1084 THE FINE STRUCTURE OF NEOPLASTIC INVASION: INVASION OF LIVER, SKELETAL MUSCLE AND LYMPHATIC VESSELS BY THE RD/3 TUMOUR. (Eng.) Carr, I. (Univ. and Weston Park Hosp., Sheffield, England); McGinty, F.; Norris, P. *J Pathol* 118(2): 91-99; 1976.

1085 ANALYSIS OF A BIOASSAY FOR CIRCULATING TUMOR CELLS IN TWO MURINE MALIGNANCIES: CORRELATIONS WITH TUMOR AGE AND EXTENT OF METASTATIC DISEASE. (Eng.) Wexler, H. (Natl. Cancer Inst., Natl. Insts. Health, Bethesda, MD 20014); Sindelar, W. F.; Ketcham, A. S. *J Surg Res* 20(2): 107-113; 1976.

1086 ENDOLYMPHATIC STROMAL MYOSIS. REPORT OF A CASE TREATED SURGICALLY AND WITH HORMONES. (Eng.) Jacobsen, K. B. (Gades Institutt, N-5000 Bergen, Norway); Haram, K. *Virchows Arch A* 369(2): 173-179; 1975.

1087 GROWTH OF MALIGNANT TUMORS TRANSPLANTED IN ATHYMIC MICE: THE VASCULAR FACTOR (Proceedings Abstract). (Eng.) Machado, E. A. (Univ. Tennessee Memorial Res. Center, Center Health Sciences, Knoxville, TN 37920); Lozzio, C. B.; Lozzio, B. B. *IRCS Med Sci (Suppl)* 3(10): 16; 1975.

1088 PLEURAL MESOTHELIOMAS--AN ANALYSIS OF 18 CASES AND REVIEW OF THE LITERATURE. (Eng.) Taryle, D. A. (Box C 272, Univ. Colorado Medical Center, 4200 East Ninth Ave., Denver, CO 80220); Lakshminarayan, S.; Sahn, S. A. *Medicine* 55(2): 153-162; 1976.

1089 DIGITAL ISCHEMIA AND GANGRENE PRECEDING RENAL NEOPLASM. AN ASSOCIATION WITH SARCOMATOID ADENOCARCINOMA OF THE KIDNEY. (Eng.) Andrasch, R. H. (Univ. Oregon Health Sciences Center, Portland, OR 97201); Bardana, E. J.; Porter, J. M.; Pirofsky, B. *Arch Intern Med* 136(4): 486-488; 1976.

1090 IMMUNOBLASTIC LYMPHOSARCOMA, A CYTOLOGICAL AND CLINICAL ENTITY? (Eng.) Mathe, G. (Institut de Cancerologie et d'Immunogenetique (INSERM), Villejuif, France); Belpomme, D.; Dantchev, D.; Khalil, A.; Afifi, A. M.; Taleb, N.; Pouillart, P.; Schwarzenberg, L.; Hayat, M.; de Vassal, F.; Jasmin, C.; Misset, J. L.; Musset, M. *Biomedicine* 22(6): 473-488; 1975.

See also:

* (Rev): 0604, 0610, 0614, 0615, 0617, 0623, 0628
* (Chem): 0647, 0684, 0715, 0721, 0722, 0734
* (Phys): 0751, 0756
* (Viral): 0819, 0863, 0876, 0878
* (Immun): 0920, 0930, 0940, 0943, 0963, 0970, 0973
* (Epid-Biom): 1092, 1093, 1094, 1095, 1096, 1097, 1109, 1110, 1112

1091 CANCER OF THE COLON AT KENT GENERAL HOSPITAL: 1965-1974. (Eng.) Montigney, P. W. (Jefferson Medical Coll., Philadelphia, PA 19107). *Del Med J* 48(2): 81-84; 1976.

A total of 112 cases of carcinoma of the colon diagnosed at one hospital between 1965 and 1974 was investigated and compared with information from other studies. All cancers were adenocarcinomas except for one case of reticulum cell sarcoma of a polyp. The Black to White ratio for colon cancer and for total admissions was 1:9 and 1:5, respectively. Sixty-eight percent of the colon cancer cases were women. The patients' ages were predominantly in the 60-79 age group. The overall survival rate for a 5-yr period was 24%, which is comparable with other studies. A 5-yr survival rate of 50% in solitary lesions with no metastasis is comparable to other studies, while a 7% "metastatic" 5-yr survival rate is slightly lower.

1092 CHRONIC GRANULOCYTIC LEUKEMIA. REVIEW OF 536 CASES. (Eng.) Kardinal, C. G. (Ellis Fischel State Cancer Hosp., Columbia, MO 65201); Bateman, J. R.; Weiner, J. *Arch Intern Med* 136(3): 305-313; 1976.

Five hundred and thirty-six chronic granulocytic leukemia (CGL) diagnosed during 1960 to 1974 from 22 institutions were retrospectively reviewed. In 100 cases, patients had positive findings for the Philadelphia chromosome (Ph'+). In 426 cases karyotyping was not done (Ph'?). Ten patients had no Ph' chromosome (Ph'-). The 10 Ph'- patients ranged in age from 8-85 yr and in survival from one to more than 125 months. Their small number and heterogeneity precluded statistical analysis, but this notable heterogeneity of the Ph'- group may well be typical. Busulfan prolonged survival in the Ph'+ and Ph'? patients. Females and younger patients tolerated their disease better than males and older patients. Survival studies without reference to the Ph' status, treatment, age at diagnosis, and sex are probably not valid.

1093 INCIDENCE RATES OF SPECIFIC HISTOLOGICAL TYPES OF LUNG CANCER IN SINGAPORE CHINESE DIALECT GROUPS, AND THEIR AETIOLOGICAL SIGNIFICANCE. (Eng.) Law, C. H. (Dept. Pathology, Univ. Singapore, Outram Road, Singapore); Day, N. E.; Shanmugaratnam, K. *Int J Cancer* 17(3): 304-309; 1976.

Data were gathered and studied to determine the incidence rates of each of the main histological types of lung cancer in the Chinese population and to determine whether there are any correlations between histological patterns and the dialect group differentials that may be of etiological significance. During the period 1968-1972, a total of 1,747 cases of lung cancer (1,285 males and 462 females) was reported to the Singapore Cancer Registry. It proved possible to type the neoplasms histologically in 476 males (37.0%) and 154 females (33.3%). Age-standardized rates by histological type were computed on the assumption that those histologically typed were a representative sample of all lung cancers. This study showed that Hokkien males have a significantly higher incidence rate of epidermoid carcinoma than the other dialect groups (Hokkien 36.1, Teochew 21.1, Cantonese 17.3). The Cantonese females have significantly higher incidence rates of both epidermoid carcinoma (Hokkien 3.7, Teochew 2.3, Cantonese 5.9) and adenocarcinoma (Hokkien 4.6, Teochew 3.6, Cantonese 11.9). Various sources of bias in studies of this type were examined; it was concluded that the differences in the histologic-specific incidence rates of lung cancer among the various Chinese dialect groups in Singapore are real and not artefactual. The significance of these findings in relation to possible etiological factors, such as cigarette smoking, was not determined; smoking may help explain the Hokkien results but the Cantonese results suggest that there is some other factor.

1094 CARCINOMA OF THE MALE BREAST: REPORT OF A SERIES OF 88 CASES. (Eng.) Langlands, A. O. (Edinburgh Royal Infirmary, Edinburgh, Scotland); Maclean, N.; Kerr, G. R. *Clin Radiol* 27(1): 21-25; 1976.

A series of 88 cases of male breast cancer was compared with 241 cases of randomly selected female breast cancer. Cases of male breast cancer differed significantly from control female cases with regard to stage of the disease, age of onset, and liability to the development of a second carcinoma. In 11 of the 88 cases (12.5%) of male breast cancer, another primary malignant tumor developed. In seven instances the large bowel or rectum was the site of the other carcinoma. When correction was made for age and for the stage of the disease, the prognosis of breast cancer in men and women was found to be similar. Only minor histological differences were found between male and female cases. Two of 54 cases examined for X-chromatin proved to be Barr-positive.

1095 CONGENITAL ANOMALIES IN CHILDREN WITH WILMS' TUMOR: A NEW SURVEY. (Eng.) Pendergrass, T. W. (Natl. Cancer Inst., Bethesda, MD 20014). *Cancer* 37(1): 403-408; 1976.

The frequency of congenital anomalies that occur with Wilms' tumor was reassessed. From 68 hospitals in the National Wilms' Tumor Study, records of 547 patients showed six patients with aniridia, 16 with hemihypertrophy, and 24 with genitourinary abnormalities. Multiple cases of Wilms' tumor occurred in three families. The results confirm high frequencies of aniridia and genitourinary anomalies in patients with Wilms' tumor, and show that concurrence with hemihypertrophy may be more often recognized or recorded now than it was ten years ago. The results demonstrate the desirability of developing checklists for other childhood neoplasms some of which have their own constellation of anomalies.

1096 BENIGN TUMORS OF THE DIGESTIVE TRACT AMONG ATOMIC BOMB SURVIVORS, 1961-1970 HIROSHIMA. (Eng.) Yamamoto, T. (Radiation Effects Res. Foundation, Hijiyama, Hiroshima 730, Japan); Kato, H.; Smith, G. S. *Gann* 66(6): 623-630; 1976.

The occurrence of benign tumors and diverticula of the digestive tract was studied in 100,000 autopsies in Hiroshima and Nagasaki. There were 664 benign tumors and 40 diverticula. Polyps were the most frequent tumor, were more common in older people, occurred as single pedunculated well-differentiated adenomatous tumors, and were generally less than 5 mm in greatest dimension. Larger polyps tended to have more atypism, but none showed definite premalignant change. No transition from benign to malignant polyps was seen. Polyps were found most frequently in the large intestine in 21% and, when cancer of the large intestine was present, benign polyps were also found. Far more polyps were found when special intensive search was made for them. Comparison of the occurrence of benign polyps in different geographic areas had to be adjusted for age and method of search as well as for other features such as histological type, dysplasia, etc. There was no evidence that the occurrence of benign tumors or diverticula was related to prior exposure to ionizing radiation.

1097 COMPARATIVE HISTOLOGICAL STUDIES ON THE LATENT CARCINOMA OF THE PROSTATE UNDER DIFFERENT ENVIRONMENTAL CIRCUMSTANCES. (Eng.) Akazaki, I. In: *Host Environment Interactions in the Etiology of Cancer in Man. Proceedings of a Meeting Held at Primosten, Yugoslavia, 27 August--2 September 1972.* IARC Scientific Publications No. 7 and Fogarty International Center Proceedings No. 18. International Agency for Research on Cancer and John E. Fogarty International Center of the National Institutes of Health USA. (Lyon, France): 89-97; 1973.

A comparative study of the prevalence and histological features of cancer of the prostate among native Japanese and Japanese migrants in Hawaii was undertaken. A total of 239 prostates of native Japanese and 145 of Hawaiian Japanese, removed at autopsy from men over the age of 50 yr in whom no carcinomatous changes had been found clinically or macroscopically, were studied. Comparisons of prevalence and the histological identification of latent prostatic carcinoma were based on slides prepared in the same manner by one technician; identical diagnostic criteria were applied by one pathologist. No significant difference in age-adjusted prevalences for all latent prostatic carcinoma between native and Hawaiian Japanese was found. However, definite differences were observed in the histological findings for cancer foci. The tendency to invasive proliferation among Hawaiian Japanese was greater than in Japan, and their experience resembled that of both whites and nonwhites in the United States. This tendency to distinct proliferation observed among Japanese migrants parallels the reported rise in mortality from clinical prostatic carcinoma. Differences in environmental circumstances, which strengthened the factors promoting the growth of prostatic cancer, may be responsible.

1098 PRIMARY LIVER CANCER AND HEPATITIS B INFECTION IN SENEGAL. COMPARISON OF CANCER PATIENTS WITH TWO CONTROL GROUPS. (Fre.) Michon, J. (Faculte de Medecine, Dakar, Senegal); Prince, A. M.; Szmuness, W.; Demaille, J.; Diebolt, G.; Linhard, J.; Quenum, C.; Sankale, M. *Biomedicine* 23(7): 263-266; 1975.

This study was made to determine whether hepatitis B surface antigen (HBsAg) is associated with primary liver cancer (PLC), which has been a matter of conflict. HBsAg and its antibody (anti-HBs) were studied in 165 PLC patients; the age/sex matched controls were 154 patients with cancer at other sites (COS) and 328 normal individuals (N). HBsAg was present in 61.2% of the PLC as opposed to 11.7% of the COS and 11.3% of the N. A correlation was found between the appearance of HBsAg in PLC patients with detectable α-fetoprotein (α-FP) levels (143/165): 72.2% with α-FP had HBsAg, as opposed to 40.3% without α-FP. Anti-HBs was found in 18.2% of the PLC, 45.4% of the COS, and 42.1% of the N. The frequency of HBsAg appearance in cirrhotic and noncirrhotic subjects was not significantly different (57.1% and 54.2%, respectively). Although HBsAg and PLC are associated, the carrier stage of hepatitis B probably precedes the hepatoma. The factors most likely involved with HBsAg infection are not transfusion or inoculation but the hormonal state (77% of the PLC patients were men), pathological history (frequency of viral, bacterial, and parasitic infection), and diet.

1099 DIETARY AFLATOXINS AND HUMAN LIVER CANCER: A STUDY IN SWAZILAND. (Eng.) Peers, F. G. (Tropical Products Inst., 56-62 Grays Inn Road, London, England); Gilman, G. A.; Linsell, C. A. *Int J Cancer* 17(2): 167-176; 1976.

The possible relationship of aflatoxin contamination and the incidence of primary liver cancer was studied in Swaziland. Aflatoxin ingestion levels were determined in "food from the plate" samples collected over a one-year period. A significant correlation between the calculated ingested daily dose and the adult male incidence of primary liver cancer in different parts of Swaziland was established. Samples of foodstuffs other than the plate samples also reflected the correlation of aflatoxin contamination and liver cancer. This extends and amplifies the findings of an earlier study in the Murang'a district of Kenya and supports the hypothesis that aflatoxin ingestion is a factor in the genesis of primary liver cancer in Africa.

1100 PREVENTION OF THE FORMATION OF MYCOTOXINS IN WHOLE WHEAT BREAD BY CITRIC ACID AND

LACTIC ACID (MYCOTOXINS IN FOODSTUFFS. IX). (Eng.) Reiss, J. (Mikrobiologisches Laboratorium, Grahamhaus Studt K. G., D-655 Bad Kreuznach, W. Germany). *Experientia* 32(2): 168-169; 1976.

The suppression of mycotoxin formation by adding preservatives to bread was studied. Citric acid and lactic acid were added to whole wheat bread dough in levels of 0.25, 0.5 and 0.75% (in relation to whole wheat). Slices of this bread were incubated at 22 C after inoculation with *Aspergillus parasiticus*, *Aspergillus versicolor*, or *Penicillium expansum*. Semiquantitative determinations of toxins (aflatoxins, sterigmatocystin, and patulin, respectively) were made. The growth of *A. parasiticus* was slightly inhibited at 0.75% of both acids, but not at lower levels. However, low levels of citric acid and high levels of lactic acid greatly inhibited the formation of aflatoxin B_1 and G_1. *A. versicolor* was more strongly affected, as there was no growth at 0.75 and 0.5% citric acid and 0.75% lactic acid. Sterigmatocystin formation was reduced at 0.25% citric acid and 0.75% lactic acid and prevented by 0.25% citric acid. Not even the highest concentrations of these acids could influence either the growth of *P. expansum* or the formation of patulin. These results suggest a biosynthetic relationship between the production of aflatoxins and sterigmatocystin.

1101 COMMUNICATION FROM BROSS (Letter to Editor). (Eng.) Bross, I. D. J. (Roswell Park Memorial Inst., Buffalo, NY 14263). *Am J Public Health* 66(2): 161; 1976.

The hypothesis that cigarette smoking is the major cause of lung cancer was defended by a reinterpretation of data that indicated a leveling off (or even a fall) in the lung cancer death rate for young people in England and a continued rise in such rates for the oldest group (65 to 74-yr-olds). It was originally interpreted to argue against a major causal role for cigarette smoking in lung cancer because the consumption of cigarettes increased during the time period studied (1950-1968); the new interpretation stressed that during this time period filter cigarettes captured a large share of the market so that actual tar and nicotine consumption actually decreased during the 1960s.

1102 ADDITIONAL COMMENTS ON THE CRITICAL ASSESSMENT OF THE EVIDENCE BEARING ON SMOKING AS THE CAUSE OF LUNG CANCER: COMMUNICATION FROM STERLING (Letter to Editor). (Eng.) Sterling, T. D. (Computer Science Program, Simon Fraser Univ., Vancouver, British Columbia, Canada). *Am J Public Health* 66(2): 161-164; 1976.

The inference that occupational and environmental factors are more important than smoking in the etiology of lung cancer was defended by citing the recent observations that lung cancer rates may be indistinguishable between smoking and non-smoking asbestos workers. The necessity of including the occupation of a smoker in cancer studies was stressed; occupational studies traditionally include the smoking habits of the subjects but smoking studies often ignore the subject's occupation. The rise in lung cancer death rates for women were explained by showing that the changes in women's employment are much more significant than the changes in their smoking habits. There appears to be a strong correlation between occupation and smoking habits in women; low rates of smoking rates are associated with traditionally female jobs, whereas in certain industries as many as 60% of the women workers smoke. Lung cancer rates among industrially employed women are similar to or greater than those for men. While lung cancer is a disease of many causes, of which smoking is one, it was concluded that there is insufficient evidence to support the hypothesis that smoking is the major cause of lung cancer.

1103 AMBIENT AIR MEASUREMENTS OF VINYL CHLORIDE IN THE NIAGARA FALLS AREA. (Eng.) Gay, B. W., Jr.; Noonan, R. C. (Natl. Environmental Res. Center, Res. Triangle Park, NC 27711); 14 pp.; 1975.

A 6-day survey was conducted in the Niagara Falls area to determine the concentration of vinyl chloride in the atmosphere. Samples were obtained in a residential area adjacent to the chemical plants where vinyl chloride emissions were suspected, in areas around the plants, and in other areas of Niagara Falls. The highest concentration of vinyl chloride measured was 40 ppb for a 5-hr integrated sample observed at a residential area two blocks east of a vinyl chloride polymerization plant. Grab samples taken downwind of chemical plants exhibited a high of 28 ppb. Samples taken from downtown Niagara Falls and upwind north of the chemical plants contained no detectable vinyl chloride. The areas surrounding the chemical plants, including the adjacent residential areas, were also affected by emissions into the atmosphere of chlorine and other halogenated compounds, as exhibited by the deterioration of metal surfaces (particularly aluminum windows and doors).

1104 CADMIUM EXPOSURE AND RENAL ACCUMULATION IN AN AUSTRALIAN URBAN POPULATION. (Eng.) Miller, G. J. (Government Chemical Lab., William St., Brisbane, Queensland 4000, Australia); Wylie, M. J.; McKeown, D. *Med J Aust* (1/2): 20-23; 1976.

An indication of the degree of cadmium exposure and renal accumulation in an Australian population (Brisbane) was obtained from cadmium determinations of urine from 98 adults with no known occupational exposure to lead or cadmium, and from kidney specimens from 91 routine post-mortem examinations. Urinary excretion of cadmium from normal or unexposed adults and lead-exposed adults was consistent with normal values from other developed countries. There was no apparent relationship between cadmium and lead excretion levels for individual urine specimens. Renal cadmium concentrations were used to estimate the average total cadmium content for a ''standard man'' and renal cortex concentrations. The results were similar to reported studies from the United Kingdom and Europe, but lower than those from Japan. Daily intake of cadmium was estimated to be 30 to 50 μg, which compares favorably with the FAO/WHO ''provisional tolerable weekly intake'' of 0.4 to 0.5 mg cadmium/adult/wk. It is concluded that Australian populations exposed to potential sources of industrial and environmental cadmium contamination should be investigated.

1105 MULTIPLE MYELOMA IN OKLAHOMA: RACIAL, AGE, SEX, GEOGRAPHIC AND TIME VARIATIONS. (Eng.) Stober, J. (Univ. Oklahoma Health Sciences Center, PO Box 26901, Oklahoma City, OK 73190); Asal, N. R. *South Med J* 69(3): 298-302; 1976.

1106 AMARANTH FOOD COLOR CLEARED FOR CONTINUED INDUSTRY USE BY HPB. (Eng.) Anonymous. (No affiliation given). *Food Can* 36(3): 28-30; 1976.

1107 PRIMARY GASTROINTESTINAL LYMPHOMA IN THE SUDAN. (Eng.) El Masri, S. H. (Dept. Surgery, Univ. Khartoum, Sudan); Ahmed, Z. E.; Hidayatalla, A. *J R Coll Surg Edinb* 21(2): 85-89; 1976.

1108 MORTALITY STUDY OF TALC MINERS AND MILLERS. (Eng.) Rubino, G. F. (Department of Occupational Med., Univ. Torino, C.T.O.--Via Zuretti 29, 10126 Torino, Italy); Scansetti, G.; Piolatto, G.; Romano, C. A. *JOM* 18(3): 186-193; 1976.

1109 PRIMARY TUMOURS OF THE SALIVARY GLANDS. (Eng.) Gupta, S. K. (Nilratan Sircar Medical Coll., Calcutta, India); Sengupta, P.; Sarkar, S. K. *J Indian Med Assoc* 65(10): 277-280; 1975.

1110 SEPARATE PRIMARY CARCINOMAS OF THE ESOPHAGUS AND HEAD AND NECK REGION IN THE SAME PATIENT. (Eng.) Cahan, W. G. (Memorial Sloan-Kettering Cancer Center, 1275 York Ave., New York, NY 10021); Castro, E. B.; Rosen, P. P.; Strong, E. W. *Cancer* 37(1): 85-89; 1976.

1111 SURVEY OF U.S. WHEAT FOR OCHRATOXIN AND AFLATOXIN. (Eng.) Shotwell, O. L. (Agricultural Res. Service, U.S. Dept. Agriculture, Peoria, IL 61604); Goulden, M. L.; Hesseltine, C. W. *J Assoc Off Anal Chem* 59(1): 122-124; 1976.

1112 FAMILY STUDIES IN CANCER OF THE COLON AND RECTUM. (Eng.) Lovett, E. (St. Mark's Hosp., London, England). *Br J Surg* 63(1): 13-18; 1976.

1113 LUNG FUNCTION PROFILES IN THE CHRYSOTILE ASBESTOS MINES AND MILLS OF QUEBEC. (Eng.) Becklake, M. R. (Dept. Epidemiology and Health, McGill Univ., Montreal, Quebec, Canada); Fournier-Massey, G.; Black, R. *Chest (Suppl)* 69(2): 303; 1976.

1114 PULMONARY FUNCTION PROFILES IN QUEBEC ASBESTOS WORKERS. (Eng.) Fournier-Massey, G. (Dept. Epidemiology and Health, McGill Univ., 3775 Univ. St., Montreal H3A 2B4, Canada); Becklake, M. R. *Bull Physiopathol Respir* 11(4): 429-445; 1975.

1115 OCCURRENCE OF HEMATOPOIETIC NEOPLASMS IN VIRGINIA OYSTERS (CRASSOSTREA VIRGINICA). (Eng.) Frierman, E. M. (Virginia Inst. of Marine Science, Gloucester Point, VA 23062); Andrews, J. D. *J Natl Cancer Inst* 56(2): 319-324; 1976.

1116 A COMPARISON OF THE DOSE TO CELLS ON TRABECULAR BONE SURFACES FROM PLUTONIUM-239 AND RADIUM-226 BASED ON EXPERIMENTAL ALPHA ABSORPTION MEASUREMENTS. (Eng.) Harley, N. H. (New York Univ. Medical Center, 550 First Ave., New York, NY 10016); Pasternack, B. S. *Health Phys* 30(1): 35-46; 1976.

1117 INDUSTRIAL CHEMICALS. GAS-LIQUID CHROMATOGRAPHIC HEADSPACE METHOD FOR VINYL CHLORIDE IN VINEGARS AND ALCOHOLIC BEVERAGES. (Eng.) Williams, D. T. (Bureau of Chemical Safety, Health Protection Branch, Ottawa, Ontario, Canada K1A OL2). *J Assoc Off Anal Chem* 59(1): 30-31; 1976.

See also:

* (Rev): 0601, 0605, 0606, 0608, 0609, 0611, 0613, 0621, 0624, 0627
* (Chem): 0658, 0683, 0694, 0695, 0696, 0697, 0726, 0741, 0743
* (Phys): 0747, 0749, 0752
* (Viral): 0878, 0880
* (Immun): 0953
* (Path): 0991, 1010, 1038, 1040, 1071, 1077

1118 PREPARATION OF LARGE NUMBERS OF UNIFORM TRACHEAL ORGAN CULTURES FOR LONG TERM STUDIES: I. EFFECTS OF SERUM ON ESTABLISHMENT IN CULTURES. (Eng.) Lane, B. P. (Dept. Pathology, State Univ. NY, Stony Brook, NY 11794); Miller, S. L. *In Vitro* 12(2): 147-154; 1976.

Rat (Wistar/Lewis) tracheas were each sectioned into fourteen rings of equal size with a slicing device which holds evenly spaced razor blades in register. The razor blades were positioned to minimize shearing of tissues during sectioning so that there was no gross tissue disruption or cell death distant from cut edges. Cultures grown in the presence of calf serum were compared with those grown in serum-free medium, using vital phase microscopy, transmission and scanning electron microscopy, and light microscopic autoradiography of thymidine incorporation. When there was calf serum in the medium, epithelization of the entire surface of the ring occurred rapidly, with the cells flattening and migrating as a sheet of closely apposed cells. Until migration was complete, mitoses were limited to the original mucosa near the cut edge. Without calf serum, migration was slow. The cells did not flatten or become closely apposed. Mitoses appeared later but were present on all areas of the surface before migration was complete. In both serum-containing and serum-free media, ciliated cells were included in the migrating population and differentiation into pseudostratified epithelium occurred on newly epithelialized surfaces. The differing pattern of mitotic activity makes culture in serum-containing media more suitable for studies of wound healing and culture in serum-free media more useful for some cytotoxicity and carcinogenicity studies.

1119 ISOLATION AND CHARACTERISATION OF CHINESE HAMSTER CELLS RESISTANT TO 5-FLUORODEOXYURIDINE. (Eng.) Slack, C. (Inst. Genetics and Virology, Glasgow G11 5JS, Scotland); Morgan, R. H. M.; Carritt, B.; Goldfarb, P. S. G.; Hooper, M. L. *Exp Cell Res* 98(1): 1-14; 1976.

Chinese hamster (Don) cells resistant to 5-fluorodeoxyuridine (FUdR) were isolated using a two-step selection procedure. In the first step, a line resistant to 1 μg/ml FUdR, designated D12/2, was obtained. From these cells a second line, D3B6, resistant to 25 μg/ml FUdR, was selected. Both D12/2 and D3B6 show little incorporation of [^{3}H]-TdR into TCA-insoluble material compared with Don, as measured by direct scintillation counting and by autoradiography of [^{3}H]TdR-labeled cultures. Thymidine kinase (TK) activities of D3B6 and D12/2 are less than 1% and 1.8%, respectively, of the Don value. HAT counter-selective-medium-resistant cells were obtained at a frequency of 1 x 10^{-3} from D12/2 and at 1 x 10^{-3} from D3B6. The HAT-resistant cells from D3B6 cultures show a wide range of TK activity. Reconstruction experiments provided evidence that D3B6 cells are killed by co-cultivation with Don cells in FUdR, and that this is probably due to metabolic co-operation. The modal chromosome number of both variant lines is 22. Trypsin banding studies on chromosomes of Don and D3B6 show a close similarity between the major Giemsa-stained bands in the two lines. The possible basis for the observed difference in FUdR resistance between D12/2 and D3B6 is discussed.

1120 ISOLATION OF NUTRIENT DEFICIENT MUTANTS AND QUANTITATIVE MUTATION ASSAY BY REVERSION OF ALANINE-REQUIRING L5178Y CELLS. (Eng.) Suzuki, N. (Faculty Medicine, Univ. Tokyo, Bunkyo-ku, Tokyo 113, Japan); Okada, S. *Mutat Res* 34(3): 489-506; 1976.

Nutrient deficient cells for alanine or purine were isolated from L5178Y cells by the 5-bromouridine-2-deoxyribose-light method. The purine requiring cells, named P, showed maximum-plating efficiency in the presence of 10^{-3} to 10^{-4} M inosine. The optimum concentration of L-α-alanine for *Ala* 32, one of the alanine requiring mutants, was 1 M. When *Ala* 32 cells were depleted of alanine, they showed an immediate decrease in incorporation of protein and DNA precursors without much change in that of RNA precursors, and they ceased to multiply. *Ala* 32 cells have been used for experiments and have been phenotypically stable for four years. A quantitative mutation assay system for the reversion of L5178Y-*Ala* 32 cells from auxotrophy to prototrophy was established. The system was applied to some known mutagens, N-methyl-N'-nitro-N-nitrosoguanidine, 4-nitroquinoline-1-oxide, UV and γ-rays.

1121 HETEROTRANSPLANTATION OF CELL LINES DERIVED FROM HUMAN MALIGNANT NEOPLASMS INTO GOLDEN HAMSTERS TREATED WITH ANTITHYMOCYTE SERUM. (Eng.) Sakakibara, K. (Inst. Medical Science, Univ. Tokyo, Shirokanedai, Minato-ku, Tokyo 108, Japan); Oota, K. *Jpn J Exp Med* 45(6): 501-504; 1975.

Thirteen cell lines of tissue culture from human malignant neoplasms were transplanted into cheek pouches of adult golden hamsters treated with anti-hamster thymocyte serum. In eleven cell lines, transplantation tests with 3.5 x 10^6 to 6.8 x 10^6 cells resulted in neoplastic growth within four weeks. In two other cell lines, one from neuroblastoma and another from Burkitt's lymphoma, the inoculum size had to be raised to 11.8 x 10^6 and 12.2 x 10^6 cells, respectively, to get tumor growth. The histological appearance of those tumors was consistent with that of the individual primary neoplasms despite their long in vitro histories. Anaplasia grading of the tumors appeared not to be correlated with the frequency of take.

1122 THE SERUM DEPENDENCE OF BABY HAMSTER KIDNEY CELL ATTACHMENT TO A SUBSTRATUM. (Eng.) Grinnel, F. (Univ. Texas Southwestern Med-cal Sch., Dallas, TX 75235). *Exp Cell Res* 97(2): 65-274; 1976.

he properties of cell attachment to substrata oated with adsorbed serum were investigated using aby hamster kidney cells (BHK-21-13s) Normal ttachment and spreading of BHK cells onto a noniving substratum (polystyrene) required the resence of a specific serum component adsorbed to he substratum surface and Ca^{2+} ions in the medium. n the absence of the adsorbed serum factor or Ca^{2+} ons cells attach but do not spread. Thus, although he initial rate of BHK cell attachment is faster n serum-free medium than in serum containing medum, no cell spreading occurred in the serum-free edium. Adsorption of serum onto the substratum esulted in a lag phase in the time course of cell ttachment which could be eliminated by blocking he negatively charged groups of the serum compoents adsorbed to the substratum surface; blockng positively charged groups or free sulfhydryl roups of the adsorbed serum components had no ffect. The requirement for serum components ould be substituted for by adsorbing molecules uch as concanavalin A (Con A) or polycationic erritin to the substratum surface; however, only on A resulted in normal morphology of cell spreadng. This evidence was consistent with a model f cell attachment and spreading in which approriate receptors on the cell surface bind dirctly to adsorbed spreading factor on the subtratum surface; Ca^{2+} ions are probably required or activation of the cell surface receptors.

123 MICROSPIKE-MEDIATED PARTICLE TRANSPORT TOWARDS THE CELL BODY DURING EARLY PREADING OF 3T3 CELLS. (Eng.) Albrecht-Buehler, . (Cold Spring Harbor Lab., Cold Spring Harbor, Y 11724); Goldman, R. D. *Exp Cell Res* 97(2): 329-39; 1976.

he behavior of 3T3 cells upon contact with coloidal gold particles (deposited on a glass subtratum prior to cell inoculation) was investiated. Freshly trypsinized cells sent out micropikes of 0.2 µm diameter and up to 10 µm length ithin 20 min after attachment to a glass subtratum. The microspikes moved actively and evenually attached to the substratum. Subsequently, amellae flowed out between lines of attached icrospikes. If, however, colloidal gold particles f 0.2-0.4 µm diameter and clusters of gold paricles up to 4 µm in diameter were placed on the ubstratum and a microspike attached to them, two eactions of the microspikes to this contact were bserved. They either retracted upon contact, ransporting the attached particles to the cell urface at a speed of 0.2 µm/sec, or the particles lowed toward the cell body while the microspike tayed in place. This action resulted in the clearng of a circular area around each spreading cell efore lamellae flowed out. ''Clearing'' proceeded t serum concentrations between 1 and 20% and in oncentrations of colchicine up to 20 µm/ml. In oncentrations of cytochalasin B higher than 5 µg/ml, however, particle removal was completely inhibited, although the microspikes were still produced by the cell. Transmission electron microscopy showed that the microspikes contained mostly longitudinally oriented microfilaments and only a few, if any, microtubules.

1124 TRANSPORT MECHANISMS IN ISOLATED PLASMA MEMBRANES: NUCLEOSIDE PROCESSING BY MEMBRANE VESICLES FROM MOUSE FIBROBLAST CELLS GROWN IN DEFINED MEDIUM. (Eng.) Li, C.-C. (Harvard Medical Sch., Boston, MA 02115); Hochstadt, J. *J Biol Chem* 251(4): 1175-1180; 1976.

The transport processes involved in the handling of a variety of nucleosides were studied in plasma membrane vesicles prepared form a mouse fibroblast cell line. The subline, L$_{929}$ mouse fibroblasts, was grown on defined medium in the absence of serum. These vesicles were not significantly contaminated by mitochondria or endoplasmic reticulum. The isolation procedure employed mechanical homogenization in isotonic medium followed by differential centrifugation. The resultant plasma membrane vesicles take up radioactivity when exposed to uniformly labeled nucleosides. Two subfractions of the plasma membrane were isolated, distinguished by their differing activity of 5'-nucleotidase and (Na+, K+)-stimulated ATPase (two plasma membrane enzyme markers). Uptake of nucleoside radioactivity was extensively studied in one subfraction; it was linear with time and membrane concentration over ranges used for the studies. Apparent Km values for uptake of radioactivity from adenosine, inosine, and uridine were 7.1 ± 3.5 µM, 53 ± 26 µM, and 6.9 ± 3.5 µM, respectively. Uptake of radioactivity from all three nucleosides exhibited a broad pH optimum from pH 7 to pH 9, but fell off rapidly at lower pH. N-Ethylmaleimide was an effective inhibitor of uptake of radioactivity from all three nucleosides; uptake of radioactivity from uridine was more sensitive than uptake of radioactivity from the purine nucleosides. Adenosine inhibited the uptake of radioactivity from inosine more than from uridine. Inosine inhibited the uptake of radioactivity from adenosine, but uridine did not. Caffeine and 6-methylaminopurine riboside (6-N-methyladenosine) differentially inhibited uptake of radioactivity from adenosine and inosine. The authors conclude that the vesicles possess separate transport systems for uptake of radioactivity from purine nucleosides and from uridine.

1125 PUTRESCINE TRANSPORT IS GREATLY INCREASED IN HUMAN FIBROBLASTS INITIATED TO PROLIFERATE. (Eng.) Pohjanpelto, P. (Dept. Virology, Univ. Helsinki, Helsinki, Finland). *J Cell Biol* 68(3): 512-520; 1976.

Putrescine (diaminobutane) transport was investigated in fibroblasts from human fetal skin, human fetal lung, and the simian virus-40 transformed lines. The rate of putrescine transport was dependent on temperature, and most of the labeled putrescine was retained by the cells after washing with excess unlabeled putrescine. The concentration of radioactivity after a [^{14}C]putrescine pulse was 85 times higher in the cells than in the medium, and over 95% of the radioactivity in the cells was as unchanged putrescine. Butanol treatment removed 70% of the radioactivity from the cells. The calculated Km was about the same for rapidly growing and for starved cultures, while Vmax was higher for the former than for the latter cultures. Putrescine transport was inhibited to varying degrees by other polyamines, but not by amino acids or divalent cations. Stimulation of cell proliferation by serum was followed by an 18 to 100-fold increase in the rate of putrescine transport, which was not inhibitable with cyclic AMP, dibutyryl cyclic AMP, or prostaglandin E_1. Removal of serum resulted in a rapid decrease in the rate of putrescine transport. Insulin in low serum medium and trypsin in the absence of serum also accelerated putrescine transport. Moreover, the rate of putrescine transport was dependent on cell density, and was faster in sparsely populated than in densely populated cultures. SV40-transformed human fibroblasts responded to addition and removal of serum in the same way as the untransformed parent cell line. The authors conclude that an increase in the putrescine transport rate is not determined only by serum, or by insulin-like factors in the serum, but may generally accompany initiation of cell proliferation.

1126 A FUNCTIONAL, ACTIVE TRANSPORT SYSTEM FOR METHOTREXATE IN FRESHLY ISOLATED HEPATOCYTES. (Eng.) Horne, D. W. (VA Hosp., Nashville, TN 37203); Briggs, W. T.; Wagner, C. *Biochem Biophys Res Commun* 68(1): 70-76; 1976.

Methotrexate transport was studied in isolated rat liver cells. The process was saturable with a Kt of 2.3 x 10^{-3} M and Vmax of 282 nmoles/min/g wet weight. The system showed a requirement for sodium ions and was sensitive to ouabain. Metabolic inhibitors, e.g., 2,4-dinitrophenol, anaerobic conditions, and deprivation of glucose, suppressed the uptake rate. Folic acid, but not folinic acid, was slightly inhibitory. It is suggested that methotrexate is transported in isolated hepatocytes by an active, sodium dependent process.

1127 PLURIPOTENTIAL STEM CELL DIFFERENTIATION IN HEMOPOIETIC COLONIES. (Eng.) DeGowin, R. L. (Univ. Iowa Hosp., Iowa City, IA 52242); Gibson, D. P. *Blood* 47(2): 315-323; 1976.

To determine if mononuclear cells proliferating in murine hemopoietic spleen colonies were pluripotential in addition to possessing kinetic features of stem cells, sequential studies of mice during their recovery from a split-dose irradiation regimen (850 R leg shielded, 3-hr interval--850 leg irradiated [850 R LS $\underline{^{3}}$ LI]) were performed. Injecting tritiated thymidine during stem cell compartment repletion 3 and 4 days after 850 R LS $\underline{^{3}}$ LI resulted in heavily labeled mononuclear cells resembling medium to large leptochromatic lymphocytes in the portion of spleen removed an hour after injection. The splenic remnant obtained from the same mouse 24-48 hr later contained lightly labeled erythroblasts, myeloid cells, and lymphoid cells. Grain counts suggested that erythroblasts and their precursors had undergone about 4 divisions, myeloid cells and their precursors 2-3 divisions, and lymphoid cells and their precursors 2-3 divisions during the 48-hr period. Similar studies in plethoric mice demonstrated the labeling of mononuclear cells on day 4 and their differentiation to myeloid and lymphoid cells by day 6. This finding confirmed that the labeled mononuclear cells were not exclusively erythroblast progenitors. On the basis of these and previous studies, it is concluded that these endogenous mononuclear cells, which replicate during stem cell compartment repletion, are pluripotential hemopoietic stem cells.

1128 SMALL RNA SPECIES OF THE HELA CELL: METABOLISM AND SUBCELLULAR LOCALIZATION. (Eng.) Zieve, G. (Massachusetts Inst. Technology, 77 Massachusetts Ave., Cambridge, MA 02139); Penman, S. *Cell* 8(1): 19-31; 1976.

The small molecular weight RNA species of HeLa cells were examined to find the location of each and speculate on their role in the architecture of the cell. The species were first isolated in specific subcellular fractions. SnA was located in the nucleolus and was partially bonded to nucleolar 28S RNA. SnD, the most abundant of the small nuclear RNAs, was partially released from the nucleus when the nuclear preparation was briefly warmed. SnF was released from the nuclei when chromatin was digested with the micrococcal nuclease and not when pancreatic DNAase was used. The remainder of the small nuclear species, SnB, SnC, and SnH, remained in the nucleus following the digestion of chromatin and are concluded to be elements of the ''nuclear skeleton.'' SnK was found predominantly in the cytoplasm, but migrated quantitatively to the nuclear fraction in the presence of high levels of actinomycin D. ScL was totally cytoplasmic and was partially bound to cell membranes; it was the 7S RNA found in oncornavirus virions. All the small nuclear RNA's appeared initially in the cytoplasmic fraction before fixation in the nucleus. Two short-lived cytoplasmic species behaved kinetically as precursors to the stable nuclear RNA's. The most important conclusion drawn from this study was that the stable small RNA species are localized in specific subcellular structures.

1129 GROWTH OF MORRIS HEPATOMA NO. 7794A WITH AND WITHOUT VITAMIN B6: EFFECT OF INOCULATION TIME. (Eng.) Tryfiates, G. P. (West Virginia Univ. Medical Center, Morgantown, WV 26506); Morris, H. P. *Eur J Cancer* 12(1): 9-12; 1976.
1976.

The effect of time of inoculation of tumor cells on the growth of the highly differentiated translantable Morris hepatoma 7794A under vitamin B6 leficient and control conditions was studied. roups of weanling Buffalo strain rats were fed ad libitum a diet lacking pyridoxine or were pair-fed he same diet supplemented with the vitamin. They vere then inoculated im in both hind legs with 794A hepatoma cells at the beginning and after 7, 5, and 31 days on their respective diets. Animals vere sacrificed 39-49 days after inoculation, umors were excised and weighed. The average weight of hepatomas grown in animals fed the vitamin leficient diet for the same length of time was lways similar and in all cases was less than the verage weight of those hepatomas grown in pair-ed (control) animals. The difference between verage tumor weights was not statistically signif-icant ($P < 0.5$) except when inoculation was per-ormed after 31 days. The average weight of tumors rom pair-fed controls, in this case, was 3 times igher than that of tumors grown in animals fed he vitamin deficient diet. The significance level as $P < 0.05$. The data were interpreted to show hat caloric restriction (pair-feeding) allows epatoma 7794A to grow as during ad libitum condi-ions provided inoculation takes place after 31 ays of feeding period.

130 INSTABILITY OF THE DURATION OF G_1 PHASE OF YOSHIDA SARCOMA AND ASCITES HEPATOMAS.

Eng.) Okumura, Y. (Res. Inst. for Tuberculosis, eprosy and Cancer, Tohoku Univ., Hirose-machi, endai 980, Japan); Matsuzawa, T. *Growth* 39(3): 31-336; 1975.

he durations and coefficients of variance of G_1, and G_2 phase were obtained for eight cell lines f ascites tumors originating from hepatomas in ats, and these were compared. Although changes in he durations of S and G_2 phases were small, the uration of G_1 phase increased with the cell cycle ime. The coefficient of variance of G_1 phase was arger than that of S and G_2 phases, most markedly t short cycle time. It is concluded that the G_1 hase is the most unstable as well as the most ariable in its duration.

131 ARTIFACTS IN THE CENTRIFUGATION OF RIBOSOMAL AND HETEROGENEOUS RIBONU-LEIC ACID IN '99%-DIMETHYL SULPHOXIDE' GRADIENTS.

Eng.) Maxwell, I. H. (Univ. Colorado Sch. of edicine, 4200 E. Ninth Ave., Denver, CO 80220). *iochem J* 153(2): 509-512; 1976.

otal RNA was extracted from cultured hamster ells that had received a long-term label with ^{14}C-ridine followed by a short-term label with ^{3}H-ridine. The sedimentation patterns of rRNA and onribosomal RNA were determined simultaneously. ncreasing the total quantity of RNA loaded on 99% imethyl sulfoxide gradients profoundly altered he sedimentation pattern of heterogeneous RNA and to a smaller extent) that of rRNA. Aggregation of mall quantities of rRNA with fast-sedimenting eterogeneous RNA also occurred in these gradients. The results indicate that a precise interpretation of experiments in which a specific mRNA sequence has been found in fast-sedimenting fractions from these gradients is difficult.

1132 BIOCHEMICAL AND MORPHOLOGICAL CHARACTERIZATION OF HEPATOMA CELLS DURING THE CELL CYCLE.

(Eng.) Quintart, J. (Laboratoire de Chimie Physiologique, Universite de Louvain and International Inst. Cellular and Molecular Pathology, 1200 Bruxelles, Belgium); Houyet, M. A.; Baudhuin, P. *Arch Int Physiol Biochim* 83(5); 989-990; 1975.

Hepatoma tissue cells (HTC, Morris 7233C) were synchronized, and the various phases of the cell cycle were monitored by measuring thymidine incorporation and mitotic index. A 35% decrease in the specific activity of mitochondrial cytochrome oxidase occurred during the G1 and S phases. Galactosyltransferase had a low specific activity at the beginning of the cell cycle. Its activity then increased and fell at the end of the G2 phase. Maximal activity for catalase was during mitosis and the beginning of G1, after which it decreased by about 20%. The number of lysosomes was higher at mitosis and decreased by 50% at the beginning of the G1 phase. The total volume occupied by mitochondria increased during the G2 phase. The volume occupied by lipid droplets and the number of these particles per unit volume was more than doubled immediately after mitosis.

1133 UPTAKE AND BINDING OF DOPAMINE AND 6-HYDROXYDOPAMINE IN MURINE NEUROBLASTOMA AND FIBROBLAST CELLS.

(Eng.) Rotman, A. (Natl. Inst. Arthritis, Metabolism, Digestive Diseases, Natl. Inst. Health, Bethesda, MD 20014); Daly, J. W.; Creveling, C. R.; Breakefield, X. O. *Biochem Pharmacol* 25(4): 383-388; 1976.

The uptake and binding of radioactive 6-hydroxydopamine (6-OH-DA) and radioactive dopamine (DA) were investigated in an adrenergic clonal line of neuroblastoma, N1E-115, derived from the murine tumor C-1300. Monolayer cultures of N1E-115 cells accumulated four times more 6-OH-DA than DA. Reserpine inhibited the uptake of DA, but not that of 6-OH-DA. When uptake was followed by a release period, these cells retained a much greater proportion of 6-OH-DA than DA. Determination of protein binding showed that 1300 pm/mg of protein of 6-OH-DA or its oxidation products was bound, compared to 120 pm/mg of protein of DA. Disc gel electrophoresis of the cellular proteins revealed an increase in the proportion of high molecular weight protein in cells incubated with 6-OH-DA when compared to proteins from cells treated with DA. The high molecular weight proteins contained bound 6-OH-DA. In a murine L-cell, B82, the uptake of both 6-OH-DA and DA was considerably less than in the neuroblastoma cell N1E 115. The percentage of radioactivity bound to protein in 6-OH-DA-treated cells was similar in both cell types and represented about 20% of the total radioactivity. The results suggest that the cytoxicity of 6-OH-DA results from irreversible covalent binding of one of the oxidation products of 6-OH-DA to cellular proteins with concomitant protein-crosslinking.

1134 INCREASED CYCLIC NUCLEOTIDE PHOSPHODIESTERASE ACTIVITY IN LEUKAEMIC LYMPHOCYTES. (Eng.) Hait, W. N. (Medical Coll. Pennsylvania, 3300 Henry Ave., Philadelphia, PA 19129); Weiss, B. *Nature* 259(5541): 321-323; 1976.

Cyclic AMP phosphodiesterase and cyclic guanosine monophosphate (cyclic GMP) phosphodiesterase activities were measured in normal and leukemic lymphocytes, and in various subcellular fractions. The phosphodiesterase activity in leukemic cell lines L5178Y and L1210, which were grown in the ascites fluid of the peritoneal cavity of $C_3D_2F_1$ (CDF) mice, was 5- to 10-fold greater than that of any of the three normal lymphocyte preparations (obtained from CDF, DBA/2, and Swiss Webster mined at substrate concentrations from 1-250 μM for cyclic AMP and from 0.8-100 μM for cyclic GMP. The maximum velocities for both the cyclic nucleotide phosphodiesterases from either line was markedly greater than those of any normal lymphocyte preparation (11-22 μM for normal cells and 141 and 224 μM for L5178Y and L1210, respectively). The greater activity in the leukemic cells was probably not caused by the physical environment because the activity in lymphocytes grown by sc injection of leukemic cells in CDF mice (73 nM cyclic AMP and 65 nM cyclic GMP hydrolyzed/mg protein/min) was not significantly different from that of leukemic cells grown in ascites fluid in CDF mice. Further experiments suggested that the greater activity of phosphodiesterase in leukemic lymphocytes was apparently not caused by the presence of a phosphodiesterase more responsive to an endogenous activator or by a phosphodiesterase in a highly activated state, but rather was attributable to a greater quantity of the enzyme in the leukemic cells. The authors suggest that the abnormal proliferation of these cells may be explained by an increase in the activity of the enzyme that catalyzes the hydrolysis of cyclic AMP.

1135 CANCER-ASSOCIATED ISOENZYME OF SERUM GALACTOSYLTRANSFERASE. (Eng.) Weiser, M. M. (Harvard Medical Sch., Boston, MA 02114); Podolsky, D. K.; Isselbacher, K. J. *Proc Natl Acad Sci USA* 73(4): 1319-1322; 1976.

Galactosyltransferase activity was assayed in sera from 58 patients with various types of cancer. On discontinuous polyacrylamide gel electrophoresis, a slow-moving peak of galactosyltransferase activity (isoenzyme II) was found to be present in the serum of 43 of these patients, in addition to the major isoenzyme I. Isoenzyme II was found in only 2 of 39 patients with various nonmalignant disorders and was not detected in the serum of 22 normal control subjects. There was no correlation between the presence of this electrophoretically distinct isoenzyme and total serum galactosyltransferase activity, alkaline phosphatase, levels of carcinoembryonic antigen, or blood type. However, patients with widespread metastases had significantly higher isoenzyme II levels than those with no metastases or with limited local spread. Furthe studies are necessary to evaluate the clinical value of this serum galactosyltransferase isoenzym in the diagnosis and monitoring of patients with neoplastic disease.

1136 BUTYRATE-INDUCED GLYCOLIPID BIOSYNTHESIS IN HELA CELLS: PROPERTIES OF THE INDUCED SIALYLTRANSFERASE. (Eng.) Fishman, P. H. (Natl. Inst. Neurological and Communicative Disorders and Stroke, Natl. Inst. Health, Bethesda, MD 20014); Bradley, R. M.; Henneberry, R. C. *Arch Biochem Biophys* 172(2): 618-626; 1976.

The properties of cytosine monophosphate-sialic acid:lactosylceramide sialyltransferase induced in HeLa cells by butyrate were studied. The butyrate caused the cells to undergo morphological changes including the extension of neurite-like processes. The activity of this enzyme was more than 20-fold higher in butyrate-treated (5 mM) cells than in cells grown without this short chain fatty acid. In vitro synthesis of hematoside from endogenous acceptors was also elevated in cells grown in the presence of butyrate. The levels of induced enzyme activity were influenced by the pH of the culture medium, being higher in most acidic cultures, but were affected markedly by varying the cell density over a wide range. Detergent was required for in vitro sialyltransferase activity, and this activity was stimulated almost 5-fold by cardiolipid (1 mg/ml). The optimum pH for in vitro activity was 6.0, and the apparent Km value for lactosylceramide was 3.5 x 10^{-5} M. Although there were several sialyltransferase activities in HeLa cells, the induced enzyme was specific for lactosylceramide.

1137 BROMODEOXYURIDINE INDUCED VARIATIONS IN THE LEVEL OF ALKALINE PHOSPHATASE IN SEVERAL HUMAN HETEROPLOID CELL LINES. (Eng.) Bulmer, D. (Dept. Botany, Univ. Texas, Austin, TX 78712); Stocco, D.; Morrow, J. *J Cell Physiol* 87(3): 357-366; 1976.

A study was undertaken to determine the mechanism by which bromodeoxyuridine (BUdR) produces changes in the alkaline phosphatase levels in cultured mammalian cells. In the several human cell lines examined, an inverse relationship between amount of induction and constitutive level of the enzyme was observed. Thus, the H.Ep 2 line, which had the highest basal level of enzyme, was reversibly repressed following exposure to the drug, whereas other cell lines with relatively low constitutive enzyme levels were induced to a maximum of 10-fold following exposure. Initiation of induction required from 24-48 hr, and as short an exposure 'pulse') as five hours was sufficient to produce nduction. Exposure to visible light had no effect pon the repression of alkaline phosphatase in .Ep 2 by BUdR. Induction did not occur in non-ividing, serum-starved cells. The time course of nduction by BUdR and hydrocortisone was similar, nd simultaneous exposure of the cells to both gents (both at 2 μg/ml) resulted in no greater nduction than that observed with either drug lone. Experiments utilizing mitomycin C yielded ignificant induction in the presence of this gent alone, and somewhat less induction when both itomycin C (0.2 μg/ml) and BUdR (2.0 μg/ml) were dded simultaneously. These results suggest that NA synthesis is required for BUdR-mediated induc-ion of alkaline phosphatase.

38 DIFFERENTIAL ACCUMULATION OF PROTEINASE INHIBITOR I IN NORMAL AND CROWN GALL ISSUES OF TOBACCO, TOMATO, AND POTATO. (Eng.)

ong, P. P. (Dept. Botany, Washington State Univ., ullman, WA 99163); Kuo, T.; Ryan, C. A. *Plant hysiol* 57(2): 214-217; 1976.

roteinase inhibitor I content of crown gall tumor ells induced in *Nicotiana tabacum*, *Solanum tubero-um*, and *Lycopersicum esculentum* by *Agrobacterium umefaciens*, strains B6 or CG-14, was determined. nhibitor I synthesis in tobacco crown gall tumors aralleled tumor growth at the average rate of bout 4.5 microg of inhibitor I per 200 mg of resh tissue per day. Infection of variegated obacco mutant Dp-I with *A. tumefaciens* strain CG-4 produced tumors with 25% more inhibitor than umors induced with strain B6. Unlike tobacco, umors induced by either bacterial strain on potato nd on tomato did not accumulate inhibitor I. onsequently, inhibitor I accumulation is modulated y the type of plant host used in spite of familial elatedness (Solanaceae) and the strain of *A. umefaciens* used for infection. Agar immunodiffu-ion assays showed no apparent differences among recipitin reaction lines between inhibitor I of umor, callus, variegated, and etiolated tissues. he immunoelectrophoretic mobilities of inhibitor of tumor, variegated and etiolated tissues were he same, but differed from that of either normal r crown gall callus tissues. These results suggest hat different isoinhibitors of inhibitor I could ccount for the observed differences in electro-horetic mobilities, or that modification of the nhibitor has occurred sometime during, or after, ts synthesis.

39 PHOSPHORYLATION AND PROTEIN KINASE ACTIVITIES OF CHROMOSOMAL NON HISTONE ROTEINS FROM CHICK EMBRYO FIBROBLASTS. (Eng.)

ruh, J. (Institut de Pathologie Moleculaire, 24, ue du faubourg Saint-Jacques, 75014 Paris, rance); Courtois, Y.; Tichonicky, L. *Biochimie* 7(11/12): 1323-1329; 1975.

onfluent chick embryo fibroblasts were cultured vitro in medium which prevented the cells from viding, medium which stimulated the cells to divide synchronously, or medium without lysine in which the cells were blocked in G_1. Chromosomal nonhistone proteins (NHP) were extracted from cells pulse labeled with ^{32}P phosphate, and the radioactivity was analyzed by acrylamide gel electrophoresis. Several radioactive peaks were found all along the gel in the NHP from confluent and stimulated cells. The highest phosphorylation was found in the fast moving proteins, but the stimulation of the cells increased the phosphorylation of the slower moving proteins. In the NHP from cells cultured in the medium without lysine only the slow migrating proteins were phosphorylated. NHP were extracted from unlabeled cultures in the three media, incubated with [γ-^{32}P] ATP and analyzed by acrylamide gel electrophoresis. Highly labeled peaks were observed in the fast moving proteins from stimulated cells and from cells cultured in a lysine-deficient medium. Comparison of in vivo and in vitro phosphorylation showed that in confluent cells the turnover of bound phosphate was slow. In stimulated cells there was a fast turnover of the phosphate bound to fast migrating proteins and a slow turnover of the phosphate bound to slow migrating proteins. In cells cultured in a medium without lysine there was a very fast turnover of the phosphate bound to a small group of fast migrating proteins and very little turnover of the phosphate bound to slow migrating proteins. The cells were incubated with labeled lysine and NHP and were analyzed by gel electrophoresis. The radioactivity of individual NHP varied with the culture conditions, but in all cases, there was little radioactivity in the fast moving proteins. The phosphate groups submitted to a fast turnover were bound to stable proteins. Phosvitin and casein kinase activities were measured in the NHP fractions. Nine to 10 peaks of activities were observed with each substrate. Some variations apparently correlated with the culture conditions.

1140 STUDIES ON SOME LIPOGENIC ENZYMES OF CULTURED MYELOID LEUKEMIC CELLS. (Eng.)

Okuma, M. (Kyoto Univ. Faculty Medicine, Shogoin, Sakyo-ku, Kyoto 606, Japan); Ichikawa, Y.; Yamashita, S.; Kitajima, K.; Numa, S. *Blood* 47(3): 439-446; 1976.

The microsomal fraction of M1 cells (a myeloid leukemia cell line) catalyzed acylation of sn-glycerol 3-phosphate by long-chain fatty acyl-coenzyme A (CoA) thioesters. The principal lipid product formed was identified as phosphatidic acid. Palmityl-CoA, stearyl-CoA, and oleyl-CoA were more effective acyl donors than linoleyl-CoA and arachidonyl-CoA. M1 cells and macrophages differentiated from them exhibited similar levels of sn-glycerol 3-phosphate-acylating activity, which were approximately one-half that in mouse liver and approximately four times that in peritoneal macrophages. The levels of acetyl-CoA carboxylase activity in M1 cells and macrophages differentiated from them were not significantly different from each other and were comparable to those in mouse liver, whereas no activity was detected in peritoneal macrophages. These results indicated that differentiation of the myeloid leukemic cells, which results in loss of leukemogenicity and mitotic activity, is not associated with changes in the activities of these lipogenic enzymes, although the cultured cells exhibited remarkably higher activities than freshly harvested peritoneal macrophages. Furthermore, the present study supports the view that the glycerophosphate pathway makes an essential contribution to the de novo synthesis of phospholipids in M1 cells, as well as in both types of macrophages.

1141 ENZYME DEFENSE AGAINST REACTIVE OXYGEN DERIVATIVES. II. ERYTHROCYTES AND TUMOR CELLS. (Eng.) Bozzi, A. (Inst. Biological Chemistry, Univ. Rome, Rome, Italy); Mavelli, I.; Finazzi Agro, A.; Strom, R.; Wolf, A. M.; Mondovi, B.; Rotilio, G. *Mol Cell Biochem* 10(1): 11-16; 1976.

The distribution of superoxide dismutase and H_2O_2-scavenging enzymes was studied in bovine RBC and in Ehrlich ascites, Yoshida ascites, and Novikoff hepatoma ascites tumor cells, and cells from a transplantable methylcholanthrene-induced rhabdomyosarcoma (MC1-A) grown in the ascites form. In RBC, superoxide dismutase and catalase were extracted in the same fraction as hemoglobin, while glutathione peroxidase appeared to be ''loosely'' bound to the cellular structure. This suggests that in RBC catalase acts in series with superoxide dismutase against bursts of oxygen radicals formed from oxyhemoglobin, while glutathione peroxidase may protect the cell membrane against low concentrations of H_2O_2. On the other hand, catalase activity was absent in the various types of ascites tumor cells, while glutathione peroxidase and superoxide dismutase were found in the cytoplasm. The peroxidase/dismutase ratio was lower than in liver cells; this may provide an explanation for the higher susceptibility of tumor cells to treatments likely to involve oxygen radicals.

1142 CHANGES IN POLY(ADENOSINE DIPHOSPHATE-RIBOSE) AND POLY(ADENOSINE DIPHOSPHATE-RIBOSE) POLYMERASE IN SYNCHRONOUS HELA CELLS. (Eng.) Kidwell, W. R. (Natl. Cancer Inst., Bethesda, MD 20014); Mage, M. G. *Biochemistry* 15(6): 1213-1217; 1976.

An antibody has been prepared which is highly specific for poly(adenosine diphosphate-ribose) (poly(ADP-ribose)). Neither poly adenosine, DNA, nor a variety of adenine-containing nucleosides or nucleotides were effective in competing with poly(ADP-ribose) for binding to the antibody. Of all compounds tested, only ADP-ribose competed for binding to the antibody. Unlabeled poly(ADP-ribose) was about 10,000 times more effective in competing with labeled polymer for antibody binding than ADP-ribose. Using the antibody, the amount of poly(ADP-ribose) was found to increase from early S phase to a peak at mid S with a second, even larger increase seen at the S-G_2 transition point in synchronously dividing HeLa cells. This seems to be due to an increase in the number of chains present and not to a variation in in chain length. Pulse labeling of the polymer with [2-^{3}H]adenosine was also maximal at the same time points. Changes in the levels of poly(ADP-ribose) polymerase activity measured in isolated nuclei coincided with the changes in amounts of polymer present in intact cells during progression from S phase into G_2.

1143 SOLUBILIZED NUCLEAR DNA-DEPENDENT RNA POLYMERASES FROM NORMAL RAT MAMMARY GLANDS AND FROM TRANSPLANTABLE R-35 RAT MAMMARY TUMORS. (Eng.) Anderson, K. M. (Faculty Medicine, Banting Inst., Univ. Toronto, Toronto, Ontario, Canada); Mendelson, I. S. *Oncology* 31(5-6): 338-356; 1975.

The distribution of nuclear RNA polymerases solubilized from rat mammary tumors, and some effects of cyclic nucleotides on their apparent activity, are reported. The three major nuclear DNA-dependent RNA polymerases (enzymes I, II and III) were present in nuclear extracts from transplantable R-35 rat mammary tumors. Except for somewhat less enzyme III, their relative distribution resembled that of nuclear extracts from late-pregnant rats. When enzyme II from normal tissue extracts was incubated for RNA synthesis with cyclic AMP, inhibition was frequently observed, but this occurre less often with nuclear extracts from the R-35 tumor. In some experiments with both normal and tumor tissue, cyclic AMP and cyclic GMP increased the apparent activity of nucleolar enzyme Ib and nucleoplasmic enzyme II, respectively. Nuclear extracts from both normal and tumor tissue were foun to contain proteins that bind radioactive cyclic A and cyclic GMP. Their patterns of binding were not identical. These results are consistent with the following hypothesis: altered binding by the tumor of cyclic nucleotides to putative nuclear 'regulatory' proteins (e.g. protein kinase subunits, or possibly other high affinity cyclic nucleotide-binding proteins unrelated to protein kinases) contributes to and may be responsible for some of the differences in response to cyclic nucleotides that were observed. It is possible that such defects occur in other tumors, or even represent a fundamental defect in all cancer cells.

1144 THE 7.1 S NUCLEAR DNA POLYMERASE AND DNA REPLICATION IN INTACT LIVER. (Eng.) Lynch, W. E. (Univ. Pittsburgh Sch. Medicine, Pittsburgh, PA 15261); Short, J.; Lieberman, I. *Cancer Res* 36(3): 901-904; 1976.

The role of the 7.1 S nuclear DNA polymerase in DNA replication was studied in Fischer 344 rats in which hepatic synthesis of DNA was stimulated by infusion of biochemicals or diet manipulation. Both treatments caused an increase in the 7.1 S DNA polymerase activity but not in the more prominent 3.2 S polymerase. The treatment also increased the synthesis of DNA in the liver. Cytosine arabinoside 5'-triphosphate and novobiocin abolished the 7.1 S polymerase activity and only slightly affected the 3.2 S activity. These results are similar to those achieved with regenerating rat liver from 70% hepatectomy animals. The authors conclude that the 7.1 S polymerase has a role in DNA replication.

1145 MEMBRANE-ASSOCIATED ENZYMES INVOLVED IN NUCLEOSIDE PROCESSING BY PLASMA MEMBRANE VESICLES ISOLATED FROM L_{929} CELLS GROWN IN DEFINED MEDIUM. (Eng.) Li, C.-C. (Harvard Medical Sch., Boston, MA 02115); Hochstadt, J. *J Biol Chem* 251 (4): 1181-1187; 1976.

The accumulation of radioactivity by two fractions of the plasma membrane vesicles isolated from a subline of mouse L_{929} cells (L_{929}se) grown in serum-free, defined medium was investigated. Transport-competent plasma membrane vesicles accumulated ribose-1-P when exposed to adenosine, inosine, guanosine, or uridine, suggesting the action of one or more nucleoside phosphorylases acting prior to, during, or subsequent to the transport event. Extravesicular ribose-1-P neither inhibited uptake nor exchanged with intravesicular ribose-1-P, indicating that the action of the phosphorylase was not prior to uptake. Preloading the vesicles with inosine prior to subjecting the vesicles to conditions under which further uptake could not take place (in the presence of caffeine) did not result in an alteration of the ribose-1-P to inosine ratio within the vesicles, indicating that only exogenously derived, not intravesicular inosine, was the substrate for the nucleoside phosphorylase. This datum, along with the fact that hypoxanthine is never found to a significant extent within the vesicles, suggests that the phosphorolytic cleavage of inosine occurs as a group translocation during the transport event itself, so that hypoxanthine is released to the surrounding medium while the ribose-1-P accumulates intravesicularly. Thus, phosphorolysis would seem to occur during passage across the membrane. Adenosine utilization by these plasma membrane vesicles appears to be closely linked to the presence of adenosine deaminase, although adenosine may also be taken up unchanged by intact cells. The relationship of other nucleic acid precusor-utilizing enzymes to transport and to the membrane has also been investigated. It was found that nucleoside phosphorylase, adenosine deaminase, and hypoxanthine phosphoribosyltransferase appeared to co-purify with the vesicles. Adenosine kinase was not found to be associated with the isolated plasma membranes, nor was it involved with any transport process carried out by the plasma membrane vesicles.

1146 STIMULATORY EFFECT OF A SERUM FACTOR ON DNA SYNTHESIS IN ISOLATED HEPATOMA NUCLEI. (Eng.) Coetzee, M. L. (Univ. Pittsburgh, Sch. Medicine, Pittsburgh, PA 15261); Dolan, M. L.; Ove, P. *Oncology* 32(1): 38-46; 1975.

A serum protein present in normal rat serum and absent from the serum of hepatoma-bearing animals at advanced stages was found to have a stimulatory effect on ^{3}H-thymidine incorporation into hepatoma cells in suspension. Liver cells maintained in a similar suspension were not affected by the factor. The stimulation appeared to be at the level of chromatin or DNA. Isolated membrane-denuded nuclei from Morris hepatoma 7777 incorporated more ^{3}H-TTP when the factor was present in the incubation mixture. Nuclei from host liver were not stimulated. The factor also stimulated incorporation of ^{3}H-TTP in a system using calf thymus DNA as primer and an extracted DNA polymerase. In this system incorporation was stimulated with DNA polymerase from both tissues, host liver and hepatoma 7777. It is concluded that the factor does not act on the DNA polymerase but on chromatin or DNA.

1147 RELEASE OF EUCHROMATIC SEGMENTS BY MG/CA-DEPENDENT AUTODIGESTION OF CHROMATIN. (Eng.) Paul, I. J. (Dept. Biology, Univ. Calgary, Calgary, Alberta, Canada T2N 1N4); Duerksen, J. D. *Biochem Biophys Res Commun* 68(1): 97-105; 1976.

Mouse TLT hepatoma chromatin was incubated in the presence of added $MgCl_2$ and $CaCl_2$ but in the absence of added exogenous nuclease. Fractionation of this chromatin by glycerol density gradient centrifugation resulted in a heterochromatin-enriched pellet and euchromatin-enriched non-pelletable fractions. This was determined by satellite DNA content analyses and analysis of nascent RNA distribution. Electron microscopic examination of the chromatin revealed it to consist of a series of connected spherical particles (nucleosomes) having a diameter of approximately 370 A. The results indicate that this method of isolating, shearing (autodigestion), and fractionating chromatin may be used to separate the euchromatic from the heterochromatic fractions, while maintaining the chromatin's initial structural features.

1148 AN ALTERED APURINIC DNA ENDONUCLEASE ACTIVITY IN GROUP A AND GROUP D XERODERMA PIGMENTOSUM FIBROBLASTS. (Eng.) Kuhnlein, U. (Dept. Biochemistry, Univ. California, Berkeley, CA 94720); Penhoet, E. E.; Linn, S. *Proc Natl Acad Sci USA* 73(4): 1169-1173; 1976.

Endonuclease activity on depurinated DNA was measured in extracts of cultured fibroblasts from xeroderma pigmentosum (XP) patients. Cell lines from complementation groups A, B, C, E, and the XP-variant had slightly reduced levels of activity, but cell lines from complementation group D had one-sixth of the normal activity. An altered pH dependence and a higher apparent Km for substrate in D-cell lines indicated that the remaining activity was also qualitatively different from the activity found in normal cells. A higher Km was also found in cell lines from the A-complementation group, but not in cell lines from the C-complementation group. These defects in apurinic deoxyribonuclease might account for the neurological disorders in patients from the D- and A-complementation groups.

components. Their synthesis was resistant to low (1 μg/ml) but clearly sensitive to high (150 μ g/ml) concentrations of α-amanitin. Consequently the synthesis of all these small-molecular-weight RNA species is catalyzed by RNA polymerase C (or III). For the assessment of the initiation frequency of the individual classes of RNA, a new technique was developed independent of labeling the 5' end of the RNA molecule with the γ-phosphate of the initiating nucleotide. It employs the double labeling of an RNA molecule with two different isotopes added sequentially at different stages of completion of the chain. The results showed a high reinitiation frequency for the small-molecular-weight RNA species at all stages of the incubation reaction. In contrast, reinitiation of the 45S precursor RNA occurs only to a limited extent in isolated HeLa cell nuclei in vitro.

1149 FAILURE OF GLOBIN mRNA TO STIMULATE GLOBIN SYNTHESIS IN CELL-FREE EXTRACTS OF INTERFERON-TREATED GLOBIN-SYNTHESIZING MOUSE ERYTHROLEUKEMIC CELLS. (Eng.) Hiller, G. (Institut fuer Virologie und Immunbiologie der Universitaet Wuerzburg, Wuerzburg, W. Germany); Winkler, I.; Viehhauser, G.; Jungwirth, C.; Bodo, G.; Dube, S.; Ostertag, W. *Virology* 69(1): 360-363; 1976.

Exogenous globin mRNA or encephalomyocarditis virus mRNA could be efficiently translated by S30 lysates of mouse erythroleukemic cells and by lysates of similar cells in which hemoglobin synthesis had been induced by dimethylsulfoxide. Cell-free extracts from interferon-treated cells had not only lost their translation capacity for viral but also for globin mRNA. The results suggest that the indiscriminate inhibition of the in vitro translation capacity of natural mRNA often seen in extracts from interferon-treated murine cells is caused by a defect of the cell-free systems. The defect in the S30 lysates of interferon-treated cells could be repaired by the addition of tRNA.

1150 NUCLEOTIDES AND CELL GROWTH. (Eng.) Seifert, W. (Salk Inst. Biological Studies, San Diego, CA). *J Supramol Struct* 4(2): 279(239)-287(247); 1976.

The role of cyclic guanosine monophosphate (cGMP) in growth induction was examined in fibroblasts in various stages of the cell cycle. Determination of intracellular cyclic AMP (cAMP) and cGMP levels in normal and transformed fibroblasts under different growth conditions showed that the transition between growing and resting states (G_0 arrest) is accompanied and probably induced by characteristic changes in cAMP to cGMP ratios. cGMP was decreased 2- to 5-fold in resting as compared to growing cultures, and increased 10 to 20-fold in activated cultures 20 min after serum induction. No major cGMP change was observed in growing, confluent, or serum-activated cultures of transformed cells. Measurement of guanylcyclase under unphysiological conditions (2 mM Mn^{2+}) in crude and purified membranes from 3T3 and SV3T3 cultures did not show increased enzyme activity in the transformed cells. Significant differences may only show up when synchronized cells pass through the restriction point in G_1 phase. It is hypothesized that transformed cells have an activated guanylcyclase system or a relaxed cGMP-pleiotypic response mechanism at the restriction point of their cell cycle.

1151 INCORPORATION OF $[^3H]$THYMIDINE STIMULATED BY ULTRAVIOLET RADIATION INTO HUMAN FIBROBLAST CULTURES. (Eng.) Stefanini, M. (Laboratorio di Genetica Biochimica ed Evoluzionistica del C.N.R., Via S. Epifanio, 14, 27100 Pavia, Italy); Dalpra, L.; Zei, G.; Giorgi, R.; Falaschi, A.; Nuzzo, F. *Mutat Res* 34(2): 313-325; 1976.

The reproducibility of the technique to quantitate DNA repair synthesis in human fibroblasts in vitro after UV irradiation was investigated. Repair synthesis was measured by UV-stimulated $[^3H]$thymidine incorporation into cells in which the semiconservative DNA replication was inhibited by hydroxyurea. Experiments performed with five fibroblast lines derived from healthy donors showed a relatively fast initial process (i.e., completed within 1 hr for 100 erg/mm^2 and within 2 hr for 500 erg/mm^2) and a subsequent slower process, evident between 2 and 6 hr after irradiation. The repair capacity of normal cells is expressed by the difference between the values of incorporation (in presence of hydroxyurea) of irradiated and control cells. The pattern of repair was similar in all five cell lines: repair capacity was positive and the amount of repair synthesis increased with incubation time after UV irradiation. Similar experiments were performed with fibroblasts derived from five patients with the classical xeroderma pigmentosum (XP) and from one patient with the De Sanctis-Cacchione syndrome. Normal and XP cells could be distinguished according to whether they displayed a positive or negative value of repair synthesis and/or according to the degree of the slope of the repair synthesis curve as a function of the incubation time after irradiation. The authors conclude that this technique can demonstrate in a rapid and simple way a defect in the DNA repair capacity in fibroblast cultures from normal subjects and patients with XP.

1152 DNA REPAIR AND LIFE SPAN OF MAMMALS. (Eng.) Hart, R. W.; Setlow, R. B. In: *Molecular Mechanisms for Repair of DNA.* Edited by P. C. Hanawalt; R. B. Setlow. (New York: Plenum Press): 801-804; 1974.

The ability of fibroblasts to perform unscheduled DNA synthesis after UV irradiation was taken as a measure of excision-repair and measured autoradiographically for seven mammalian species (man, elephant, cow, hamster, rat, mouse, and shrew). Data were examined for correlations between life span and DNA repair. It was assumed that the accumulation of unrepaired errors, such as cyclobutylpyrimidine dimer-induced secondary structure

1153 MOUSE NEUROBLASTOMA CELL ADENYLATE CYCLASE: REGULATION BY 2-CHLOROADENOSINE, PROSTAGLANDIN E_1, AND THE CATIONS Mg^{2+}, Ca^{2+}, AND Mn^{2+}. (Eng.) Blume, A. J. (Roche Inst. Molecular Biology, Nutley, NJ 07110); Foster, C. J. *J Neurochem* 26: 305-311; 1976.

In order to gain further insight into the role of cyclic nucleotides in neuronal function some basic kinetic properties of adenylate cyclase in cell free preparations of mouse neuroblastoma were investigated. Divalent cation effects and activation by 2-chloroadenosine and prostaglandin E_1 of the neuroblastoma adenylate cyclase were compared with ion effects and hormone activation of the enzyme obtained from non-neuronal tissue. Production of cAMP from ATP by the enzyme required the presence of either $Mg^{2}+$ or $Mn^{2}+$ in addition to ATP. In the presence of $Mg^{2}+$, the Km for ATP was 120 ± 15 μM. The interaction of ATP and adenylate cyclase appeared to be non-cooperative (Hill coefficient of 1). Magnesium ion concentrations in excess of the ATP concentration caused stimulation although similar excess concentrations of $Mn^{2}+$ caused inhibition. Prostaglandin E_1 and 2-chloroadenosine activated the enzyme. The Km of the cyclase for 2-chloroadenosine was 6 μM. Activation by 2-chloroadenosine led to an increase in Vmax but did not effect the Km for ATP. At a fixed ATP concentration, the extent of activation caused by prostaglandin E_1 and 2-chloroadenosine was inversely related to the $Mg^{2}+$ concentration. Calcium ion caused inhibition of adenylate cyclase from 0.1 to 4 mM with a Ki of 5×10^{-4} M. $Ca^{2}+$ interaction with the enzyme in the absence or presence of either 2-chloroadenosine or prostaglandin E_1 appeared cooperative (i.e. Hill coefficients of approximately 2). $Ca^{2}+$ inhibition was non-competitive with respect to either ATP or 2-chloroadenosine but was progressively diminished by increasing $Mn^{2}+$ concentrations. The authors conclude that mouse neuroblastoma adenylate cyclase has many properties in common with the enzyme obtained from non-neuronal tissues. The ability of $Mg^{2}+$, $Mn^{2}+$, and especially $Ca^{2}+$ to affect the activity of the neuroblastoma enzyme may indicate the existence of a special role for these ions in controlling neuronal adenylate cyclases.

154 THE ENHANCED PRODUCTION OF HYALURONIC ACID BY CULTURED RAT FIBROBLAST CELLS TREATED WITH CYCLIC AMP AND ITS DIBUTYRYL DERIVATIVE. (Eng.) Koyama, H. (Japanese Foundation for Cancer Res., Toshima-ku, Tokyo 170, Japan); Tomida, I.; Ono, T. *J Cell Physiol* 87(2): 189-198; 1976.

Cells of a newly established rat fibroblast line (SEN) in culture were observed to synthesize mucopolysaccharides, which were identified as hyaluronic acid, chondroitin-4-sulfate and heparan sulfate. Treatment of the cells with adenosine 3':5'-cyclic monophosphate or dibutyryl adenosine 3':5'-cyclic monophosphate resulted in a marked stimulation of production of hyaluronic acid, but not of the other mucopolysaccharides. Treated cells also showed increased activity of hyaluronic acid synthetase, a reduction in growth rate, and morphological alteration. In addition, 5-bromodeoxyuridine (1.6×10^{-5} M) was found to counteract greatly the cyclic AMP effect.

1155 THE EFFECT OF CYCLIC AMP AND PROSTAGLANDINS ON THE FIBRINOLYTIC ACTIVITY OF MOUSE NEUROBLASTOMA CELLS. (Eng.) Laug, W. E. (Univ. Children's Hosp., CH3000, Berne, Switzerland); Jones, P. A.; Nye, C. A.; Benedict, W. F. *Biochem Biophys Res Commun* 68(1): 114-119; 1976.

The effects of cyclic AMP agents on the fibrinolytic activity of mouse C1300 neuroblastoma cells in culture were investigated. The intra- and extracellular activities of plasminogen activator were increased up to 14-fold by treatment with these agents. Prostaglandin E_1 and prostaglandin E_2 (both at 3×10^{-5} M) and butyric acid (10^{-3} M) were the most efficient inducers, followed by propionic acid (10^{-3} M) and dibutyryl cyclic AMP (10^{-3} M). Theophylline (10^{-3} M) was ineffective. The highest enzyme activities were found in cells exposed simultaneously to prostaglandin E_1 (3×10^{-5} M) and dibutyryl cyclic AMP (10^{-3} M), causing a 1400% increase in the level of extracellular enzyme.

1156 CATECHOLAMINE-INDUCED CYCLIC AMP AND MORPHOLOGIC ALTERATION IN GLIOMA CELLS. (Eng.) Schlegel, B. (Fachbereich Biologie der Universitaet Konstanz, Konstanz, W. Germany); Oey, J. *Naturwissenschaften* 62(2): 534-535; 1975.

The effects of several compounds of neuronal origin on C6 rat glioma cells were investigated. Treatment with 10^{-4} M solutions of various catecholamines (adrenaline, noradrenaline, dopamine, or histamine) resulted in a cell morphology resembling that of a typical starlike astrocyte. The same compounds caused an elevated cyclic AMP concentration. Treatment with 10 μM dl-propanolol inhibited both of these effects. A combination of 1 mM dibutyryl cyclic AMP and 100 μM theophylline caused the same response in cellular appearance but was not inhibited by dl-propanolol.

1157 LOSS OF NON-HISTONE CHROMATIN PROTEIN PARALLELS IN VITRO DIFFERENTIATION OF CARTILAGE. (Eng.) Newman, S. A. (Univ. Pennsylvania, Sch. Medicine, Philadelphia, PA 19174); Birnbaum, J.; Yeoh, G. C. T. *Nature* 259(5542): 417-418; 1976.

A change in the complement of non-histone chromosomal proteins in an in vitro system that closely approximates the differences in the chromosomal proteins of cell types which are adjacent in a development lineage was found. Tissue was isolated from chick wing buds; nuclei were isolated from half this tissue, and from these chromatin was prepared. The other half of the tissue was cultured; after 3 days in culture, nuclei were isolated from this tissue and chromatin was prepared as before. The two chromatin preparations were run simultaneously on 25 cm 10% polyacrylamide gels containing 0.1% sodium dodecyl sulphate. There was a heavily stained band of low mobility (molecular wt between 125,000 and 150,000) in the freshly explanted but not cultured material that was not present in the cultured material. These two preparations represent cell types which are adjacent in lineage: loss of this protein or the loss of its affinity for the stain suggested a role for this component in nuclear reprogramming.

1158 INHIBITORY EFFECT OF DIBUTYRYL CYCLIC AMP AND THEOPHYLLINE ON THE AGGREGATION OF HUMAN BREAST TUMOR CELL LINE BT-20. (Eng.)

Tchao, R. (Medical Coll. Pennsylvania, 3300 Henry Ave., Philadelphia, Pa. 19129); Leighton, J. *Nature* N 259(5540): 220-222; 1976.

Dibutyryl (db) cyclic adenosine monophosphate (AMP), cyclic AMP, theophylline, papaverine, and trifluoperazine were tested for the ability to inhibit the aggregation of human mammary tumor cell line BT-20. Cells were grown with 10% fetal calf serum and 20 µg ml^{-1} insulin. Aliquots of cell suspensions were shaken for 24 hr at 37 C at 72 r.p.m.; the cells were then washed and suspended. Aggregate size was measured. The aggregation over 24 hr depended on the number of cells in the incubation. The mean aggregate size was 0.5×10^6 to 1.0×10^6 ml^{-1}. In 10% serum the aggregates were slightly larger. The addition of 2 mM db cyclic AMP and 2 mM theophylline greatly inhibited cell aggregation. The inhibitory effect of db cyclic AMP and theophylline was reversible. Viability was ascertained by the Trypan blue exclusion test after 24 hr of incubation. Both treated and control cell incubations showed the same viability (90%); therefore db cyclic AMP and theophylline did not kill the cells. The possibility that the cells hydrolized db cyclic AMP to butyrate was tested by adding 2 mM sodium butyrate; this proved highly toxic. A lower concentration (0.5 mM) showed neither detectable toxicity nor any effect on aggregation. Cyclic AMP alone inhibited aggregation, but higher concentrations were needed (5-10 mM). Theophylline alone was almost as effective as in combination with db cyclic AMP. Papaverine (100 µM) produced 70-80% inhibition of aggregation without toxicity. Trifluoperazine was highly toxic at 50 µM, but at 20 µM there was neither toxicity nor inhibition of aggregation. It is suggested that cyclic AMP, by modulating adhesion between carcinoma cells, has a role in the propagation of cancer.

1159 TISSUE-SPECIFIC CHROMOSOMAL NON-HISTONE PROTEIN INTERACTIONS WITH DNA. (Eng.)

Wang, S. (M. D. Anderson Hosp. and Tumor Inst., Houston, TX 77025); Chiu, J.-F.; Klyszejko-Stefanowicz, L.; Fujitani, H.; Hnilica, L. S.; Ansevin, A. T. *J Biol Chem* 251(5): 1471-1475; 1976.

A group of chromosomal non-histone proteins with affinity for DNA (NP) was isolated from rat liver and Novikoff hepatoma. This fraction (less than 5% of the total chromatin protein content) binds preferentially to unique, double-stranded sequences of fractionated homologous DNA. The interactions are strong at low ionic strength ($Km = 6.7 \times 10^{-9}$ M) and decrease with rising salt concentration. Complexes of the NP protein fraction with homologous DNA are immunologically tissue-specific. As determined by microcomplement fixation, the NP proteins in Novikoff hepatoma are associated with the transcriptionally active, diffuse fraction of chromatin.

1160 PHOSPHORYLATION OF NON-HISTONE CHROMATIN PROTEINS IN NORMAL AND REGENERATING RAT LIVER, NOVIKOFF HEPATOMA AND RAT HEART. (Eng.)

Ezrailson, E. G. (Baylor Coll. Medicine, Houston, TX 77025); Olson, M. O. J.; Guetzow, K. A.; Busch, H. *FEBS Lett* 62(1): 69-73; 1976.

^{32}P-labeling of chromatin nonhistone chromatin proteins (NHP) was compared in growing and nongrowing cells. Carrier-free ^{32}P neutralized with 1 N NaOH and diluted to 70 mCi/ml was injected ip into male Holtzman rats two hours before liver and heart tissues were removed. Seventy percent hepatectomy was performed 18 hr prior to the ^{32}P injection for studies on regenerating liver. Novikoff hepatoma cells were obtained six days after transplantation. At least two proteins, C18 and Cg', incorporated relatively greater amounts of ^{32}P in regenerating liver and hepatoma, which have growing and dividing cells, than did normal liver and heart. The major ^{32}P-labeled NHP were common to the four tissues. Since spots C18 and Cg' have been previously shown to be nucleolus-specific, the increased uptake of label in regenerating liver and hepatoma may be correlated with the increased rate of ribosomal RNA synthesis.

1161 TRANSCRIPTION OF SPECIFIC GENES IN ISOLATED NUCLEI FROM HELA CELLS IN VITRO.

(Eng.) Udvardy, A. (Biokemiai Intezet, M.T.A. Szegedi Biologiai Koezpont, H-6701 Szeged, Postafiok 521, Hungary); Seifart, K. H. *Eur J Biochem* 62(2): 353-363; 1976.

Isolated HeLa cell nuclei were employed to catalyze the synthesis of RNA in vitro. In the presence of low concentrations of α-amanitin (1 µg/ml), used to suppress the formation of heterogeneous nuclear RNA, these nuclei synthesized RNA very efficiently for extended periods of time (at least 60 min) at an elongation rate of about seven nucleotides per second. The product, analyzed on sucrose density gradients and polyacrylamide gels, was found to exist in two predominant size classes. Synthesis of the 45S ribosomal precursor was completely resistant even to high concentrations of α-amanitin (150 µg/ml) and hence was catalyzed by enzyme A (or I). A limited degree of processing of the 45S precursor occurred in vitro. In addition, a second RNA class of low molecular weight (4-8S) was synthesized by HeLa cell nuclei in the presence of 1 µg/ml α-amanitin in vitro. Analysis on 8% polyacrylamide gels resolved the RNA into four distinct alterations, would increase the noise-to-message ratio and lead to cellular malfunctions. Cells were cultured at 37 C in a 5% CO_2 environment and irradiated at a density of 10^4 cm^2, then incubated with 2 x 10^{-3} hydroxyurea to suppress normal synthesis and 2 µCi/ml [^3H]dThd. After 10 J/m^2 of UV, all cells showed unscheduled DNA synthesis, and the average amount per cell was several times greater for human than for mouse fibroblasts. It was suggested that the difference is accounted for primarily by differences in the number of repaired sites. There was excellent correlation between unscheduled DNA synthesis and the life span of the animals. This supports the assumption that unrepaired alterations in the structure of DNA play a large role in aging.

1162 INHIBITORY CHARACTERISTICS OF TUMOR tRNA METHYLASE PREPARATIONS. (Eng.) Forrester, P. I. (Faculty of Medicine, Univ. of Calgary, Calgary, Alberta, Canada); Hancock, R. L. *Cancer Lett* 1(3): 161-164; 1976.

Competing enzymes (or potential inhibitors) of tRNA methylases present in normal adult liver were studied to determine whether they caused perturbations in tRNA methylase activity of hepatoma extracts. When increasing amounts of extracts from normal liver were added in vitro to enzyme preparations, no inhibition resulted. However, if glycine is added to the reaction mixture, there is a resultant decrease in tRNA dependent methylation. Conversely, if hepatoma preparations were added to normal liver enzymes, inhibition could be demonstrated only in the presence of glycine. It is concluded that differences in tRNA methylase activities of various tissues are not dependent on the presence or absence of inhibitors.

1163 HYDROCORTISONE INDUCTION OF PHENYLALANINE HYDROXYLASE ISOZYMES IN CULTURED HEPATOMA CELLS. (Eng.) Miller, M. R. (Milton S. Hershey Medical Center, Pennsylvania State Univ., Hershey, PA 17033); Shiman, R. *Biochem Biophys Res Commun* 68(3): 740-745; 1976.

The hydrocortisone stimulation of phenylalanine hydroxylase activity in Reuber H4 hepatoma cells was shown to be associated with an alteration in phenylalanine hydroxylase isozyme composition. Three forms of phenylalanine hydroxylase were identified in H4 cells that had been treated with hydrocortisone; however, only one of these forms was present prior to glucocorticoid treatment. The relative amounts, as well as the total amount, of the three forms and their chromatographic behavior on hydroxylapatite were nearly identical to the three phenylalanine hydroxylase isozymes found in adult rat liver. These results show that hydrocortisone alters the phenylalanine hydroxylase isozyme composition of H4 cells by inducing the expression of at least one new subunit. It also ncreases the synthesis rate of the constitutive subunit and stimulates a protein modification system.

1164 CHANGES IN RNA SYNTHESIS DURING THE LIFE SPAN OF HUMAN FIBROBLASTS IN VITRO. (Eng.) Macieira-Coelho, A. (Hopital Paul-Brousse, 14-16 avenue Paul-Vaillant-Couturier, F-94800 Villejuif, France); Loria, E. *Gerontology* 22(1/2): 79-88; 1976.

The prolongation of the life span of human fibroblasts in vitro by hydrocortisone eems to be associated with its stimulatory action on ribosome synthesis. After withdrawal of hydrocortisone, the sustaining effect of the hormone on the latter remains for a time, dependent on the age of the cells. When hydrocortisone is removed from cultures that have grown beyond the life span of the controls, the cells die within two passages. Thus, the events leading to the growth decline took place in spite of the presence of the hormone, which does not seem to prevent the aging process but rather to delay it by stimulation of ribosome synthesis. These results could be compatible with either the error hypothesis or the theory which explains aging by an increased binding of histones to DNA with the subsequent blocking of genetic information.

1165 UPTAKE OF RIBOSOMAL PROTEINS BY ISOLATED HELA NUCLEI. (Eng.) Roth, H. E. (Roche Inst. Molecular Biology, Nutley, NJ 07110); Bolla, R.; Cox, G. S.; Redfield, B.; Weissbach, H.; Brot, N. *Biochem Biophys Res Commun* 69(3): 608-612; 1976.

The uptake of radioactive ribosomal proteins by isolated HeLa cell nuclei was studied. Ribosomal proteins were taken up by nuclei in vitro more rapidly than are cytosol proteins, suggesting that the uptake is selective. In addition, the ribosomal proteins were found associated with the nucleolus to a greater extent than were the cytosol proteins.

1166 HYDROCORTISONE INHIBITS THE SPONTANEOUS DETACHMENT OF VIABLE MAMMARY TUMOR CELLS FROM MONOLAYER CULTURES. (Eng.) Hosick, H. L. (Dept. Zoology, Washington State Univ., Pullman, WA 99163). *Cancer Lett* 1(4): 211-214; 1976.

The way in which the kinetics of cell release of mouse mammary adenocarcinomas are altered by an adrenal corticoid was studied. Primary mammary adenocarcinomas of C3H mice were dissociated to single cells. These cells were seeded at a density of 5 x 10^5/cm^2 substrate area and were grown as monolayers for 36 days in high-serum medium supplemented with insulin (5 µg/ml). Cultures became confluent within a few days, and confluence was maintained throughout the culture period. Viable cells (representing a mitotic cell population) were released spontaneously from the confluent monolayer and could be harvested from the culture fluid. The rate of cell release declined after about 30 days, apparently due to mitotic pool depletion. Release of cells from the monolayer was strongly depressed in medium containing hydrocortisone (10 µg/ml). The cell release event and its alteration by hydrocortisone may reflect the propensity toward shedding of cells from these tumors in vivo and the alteration of metastatic incidence by adrenal steroids.

1167 SEPARATION AND QUANTITATIVE DETERMINATION OF RIBONUCLEOSIDE AND DEOXYRIBONUCLEOSIDE TRIPHOSPHATES IN HUMAN MALIGNANT TUMORS.

(Eng.) Kraml, F. (Chirurgische Universitaetsklinik, D-7400 Tuebingen, W. Germany); Kummer, D.; Schmidt, K. *Anal Biochem* 71(2): 500-506; 1976.

A method for the separation and determination of ribonucleoside and deoxyribonucleoside triphosphates in tumor cells is described. Using an acetate buffer as solvent for thin layer chromatography, a direct fluorometric determination is possible without preliminary elution of the nucleoside triphosphates from the plate. Minimum amounts of 0.5 nmol are detectable. By this method the concentration of the triphosphates was measured in Ehrlich ascites tumor cells and in several human malignant tumors of different proliferation rates. The results indicated that the clinically visible growth rate of the neoplasms correlates with the ATP content of the tumors.

1168 SIMILARITIES BETWEEN 5α-DIHYDROTESTOSTERONE-RECEPTOR COMPLEXES FROM HUMAN AND RAT PROSTATIC TISSUE: EFFECTS ON RNA POLYMERASE ACTIVITY.

(Eng.) Davies, P. (Welsh Natl. Sch. Medicine, Heath, Cardiff, CF4 4XX, U.K.); Griffiths, K. *Mol Cell Endocrinol* 3: 143-164; 1975.

The role of steroid-receptor complexes in regulating RNA synthesis in Sprague-Dawley rat ventral prostate tissue and human hypertrophic prostate, and the ability of these complexes, labeled with $[^3H]$5-dihydrotestosterone ($[^3H]$DHT), to transfer radioactivity into nuclear preparations was investigated. In addition, the stimulation of RNA polymerase activity of isolated nuclei was studied. Protein macromolecules specifically binding $[^3H]$ DHT were identified in cytosol and in nuclei prepared from human benign hypertrophic prostate. These macromolecules had similar properties to receptor proteins from other androgen-dependent tissues. Cytosol preparations from androgen-dependent tissues transferred $[^3H]$DHT in a recoverable protein-bound form to nuclei of other androgen-dependent tissues but not to nuclei of androgen-independent tissues. No transfer of radioactive steroid from cytosol of these latter tissues to any nuclei was achieved. Labeled cytosol preparations from androgen-dependent tissues stimulated the RNA polymerase activity of nuclei from androgen-dependent tissues but not that of nuclei from androgen-independent tissues. Cytosol preparations from these latter tissues had no effect on RNA polymerase activity. Under suitable ionic conditions, human cytosol preparations containing DHT stimulated both alpha-amanitin-sensitive and -insensitive RNA polymerase activities of human prostatic nuclei. However, rat ventral prostatic DHT-cytosol protein complexes were equally as efficient in performing this function, suggesting the possible involvement of specific DHT-receptor complexes in this process. The authors suggest that receptor molecules from androgen-dependent tissues may not be specific but may share properties which would facilitate research into the understanding and etiology of pathological conditions.

1169 EFFECTS OF PROSTAGLANDINS ON PROLACTIN AND GROWTH HORMONE SYNTHESIS AND SECRETION IN CULTURED RAT PITUITARY CELL.

(Eng.) Gautvik, K. M. (Inst. Physiology, Univ. Oslo, Karl Johansgate 47, Oslo 1, Norway); Kriz, M. *Endocrinology* 98(2): 352-358; 1976.

The effects of prostaglandins E_1, E_2, $F_{1\alpha}$, and $F_{2\alpha}$ on prolactin and growth hormone synthesis and secretion were studied in cultured rat pituitary cells. Total extracellular accumulation of prolactin was measured by radioimmunoassay. The cells were cultured in the presence of $[^3H]$leucine for the last hour of each treatment period to determine hormone synthesis. The intra- and extracellular radioactive hormones were determined in the same microsample by a specific and quantitative immunoprecipitation method, employing polyacrylamide gel electrophoresis in the presence of sodium dodecyl sulfate. The results showed that all prostaglandins stimulated the extracellular accumulation of prolactin at 3-30 nM. Prostaglandin E_1 was more effective in stimulating extracellular accumulation of prolactin than prostaglandin E_2 and the F compounds. Prostaglandin $F_{2\alpha}$ at 3 nM doubled the rate of prolactin synthesis, but had no effect on growth hormone or total cell protein synthesis after 24 hr of treatment. The first effect of prostaglandin $F_{2\alpha}$ was observed after five hours of incubation, and the time-course of effect on prolactin synthesis was similar to that of thyrotropin-releasing hormone.

1170 MEASUREMENTS OF PROLACTIN AND GROWTH HORMONE SYNTHESIS AND SECRETION BY RAT PITUITARY CELLS IN CULTURE.

(Eng.) Gautvik, K. M. (Inst. Physiology, Univ. Oslo, Karl Johans Gate 47, Oslo 1, Norway); Kriz, M. *Endocrinology* 98(2): 344-351; 1976.

A specific and sensitive immunoprecipitation method for measurements of biosynthesized radioactive prolactin and growth hormone is described. Antisera to rat prolactin and growth hormone were developed in the rabbit and monkey, respectively. The specificity of the immune sera was assessed by polyacrylamide gel electrophoresis of the dissolved immunoprecipitates. The two antisera showed cross-reactions with the non-homologous hormone of less than 1%. Separation of ^{3}H-prolactin and growth hormone by immunoprecipitation, followed by polyacrylamide gel electrophoresis in the presence of sodium dodecyl sulfate, was 95-97% complete. When both hormones were measured in the same microsample by sequential immunoprecipitation, the reaction was 97% complete for determination of intra- and extracellular prolactin and extracellular growth hormone, but 85% complete for determination of intracellular growth hormone. This method was used to characterize the basal synthesis and secretion of prolactin and growth hormone in three related pituitary cell strains. Radioactive prolactin and growth hormone were obtained from monolayer cultures when the cells were grown in the presence of $[^3H]$L-leucine. The rate of prolactin synthesis and extracellular accumulation was higher than that of growth hormone in a cell strain which produced both hormones. In these cells, prolactin synthesis represents 1-5%, and growth hormone 0.1-0.6% of total protein synthesis.

1171 PREGROWTH HORMONE: PRODUCT OF THE TRANSLATION IN VITRO OF MESSENGER RNA CODING FOR GROWTH HORMONE. (Eng.) Sussman, P. M. (Dept. Biological Sciences, Columbia Univ., New York, NY 10027); Tushinski, R. J.; Bancroft, F. C. *Proc Natl Acad Sci USA* 73(1): 29-33; 1976.

Membrane fraction RNA isolated from rat pituitary tumor (GC) cells was translated in a wheat germ extract. A product was synthesized which was immunologically related to growth hormone, but migrated more slowly than growth hormone upon sodium dodecyl sulfate-acrylamide gel electrophoresis. The mobility of the cell-free product on gels of this type was unchanged by treatment with either KOH or RNase. The mobilities during paper electrophoresis of the methionine-containing tryptic peptides obtained from the cell-free product were identical to those obtained from growth hormone secreted by the GC cells. Molecular weights for growth hormone and the cell-free product of 19,500 and 24,000, respectively, were determined by gel electrophoresis of these proteins with marker proteins of known molecular weights. No protein with the properties of the cell-free product was detected after a two-minute incubation of the GC cells with $[^{35}S]$-methionine. However, treatment of the GC cells with a protease inhibitor, L-1-tosylamide-2-phenylethylchloromethyl ketone (TPCK), led to the appearance of a new polypeptide, immunologically related to growth hormone, with a gel mobility identical to that of the cell-free product. These results imply that the cell-free product represents a growth hormone precursor which is rapidly converted to growth hormone in pituitary cells.

1172 DIRECT INDUCTION BY ESTRADIOL OF VITELLOGENIN SYNTHESIS IN ORGAN CULTURES OF MALE XENOPUS LAEVIS LIVER. (Eng.) Green, C. D. (Natl. Inst. Medical Res., Mill Hill, London NW7 1AA, England); Tata, J. R. *Cell* 7(1): 131-139; 1976.

Organ cultures of liver from untreated male Xenopus responded to 17β-estradiol in the culture medium by synthesizing and secreting the yolk protein precursor vitellogenin. Vitellogenin synthesis, as a primary response, was first detectable on the fourth day of culture, and comprised up to 12% of the protein synthesized on the eighth day. Estradiol is required during the lag period of four days. Tissue injected with 1 mg of estradiol 30 days before the start of culture responded to estradiol more rapidly and to a greater extent than did uninjected tissue. During such a secondary response, vitellogenin was first detectable in the medium on the second day of culture, and comprised up to 24% of the protein synthesized on day 6. The rate of amino acid incorporation into total protein also increased in response to estradiol, but the rate of synthesis of albumin decreased rapidly in culture whether or not estradiol was present, in both the primary and secondary responses. A maximal response was seen with 10^{-8} M estradiol. Progesterone, testosterone, dexamethasone, and insulin neither induced vitellogenin synthesis in culture nor modified the response to estradiol. DNA synthesis inhibitors did not prevent the response to estradiol in vitro, suggesting that cell division is not required for the initial response leading to vitellogenin synthesis.

1173 RECEPTOR CHARACTERISTICS OF SPECIFIC ESTROGEN BINDING IN THE RENAL ADENOCARCINOMA OF THE GOLDEN HAMSTER. (Eng.) Li, J. J. (Veterans Admin. Hosp., 54th St. and 48th Ave. South, Minneapolis, MN 55417); Talley, D. J.; Li, S. A.; Villee, C. A. *Cancer Res* 36(3): 1127-1132; 1976.

Estrogen receptors in primary and metastatic renal adenocarcinoma of the hamster were studied and compared with those in the uterus. Linear sucrose gradient analyses revealed that all estrogen-induced and -dependent primary renal tumor cytosols examined contained an 8S and variable amounts of 4S receptor in low ionic buffer concentrations. Similar results were obtained with extracts of primary metastases of these tumors. Sucrose gradients containing high salt (0.4 M KCl) converted the 8S receptor in both the hamster renal tumor and uterus to a 4-5S complex. Scatchard plot analysis revealed that the renal tumor cytosol estradiol-receptor complex has a Ka of 1.7×10^2 M^{-1} and 9.2×10^{-10} M binding sites. Competition for the tritiated 17beta-estradiol binding sites in the renal tumor was similar to that in the uterus with respect to estrogenic compounds. Nonestrogenic steroids exhibited minimal competition at the same concentrations or higher. Substitution in the ring structure, particularly in position 3 of the phenolic A-ring, resulted in a considerable loss in the ability of such compounds to compete for these receptors. Antiestrogens were effective competitors for these estrogen receptors only at higher concentrations relative to the tritiated estradiol.

1174 CELL SIZE AND MUTUAL CELL ADHESION. II. EVIDENCE FOR A RELATION BETWEEN CELLS SIZE, LONG-RANGE ELECTROSTATIC REPULSION AND INTERCELLULAR ADHESIVENESS DURING DENSITY-REGULATED GROWTH IN SUSPENSION. (Eng.) Deman, J. J. (Academic Clinic, State Univ., Ghent, Belgium); Vakaet, L. C.; Bruyneel, E. A. *J Membr Biol* 26(2/3): 205-215; 1976.

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1176 SYSTEM DYNAMICS OF A METASTATIC PROCESS FROM AN IMPLANTED TUMOR. (Eng.) Saidel, G. M. (Dept. Biomedical Engineering and Biometry, Case Western Reserve Univ., Cleveland, OH 44106); Liotta, L. A.; Kleinerman, J. *J Theor Biol* 56(2): 417-434; 1976.

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1179 EFFECT OF STRESS ON BLOOD PERFUSION AND VASCULAR SPACE IN TRANSPLANTED MOUSE TUMOURS (Letter to Editor). (Eng.) Zanelli, G. D. (Mount Vernon Hosp., Northwood, Middlesex HA6 2RN, England); Lucas, P. B. *Br J Radiol* 49(580): 382-383; 1976.

1180 BRIEF COMMUNICATION: ENHANCED GROWTH RATE OF TRANSPLANTED MAMMARY ADENOCARCINOMA INDUCED IN C3H MICE BY DIETARY LINOLEATE. (Eng.) Rao, G. A. (Veterans Admin. Hosp., Martinez, CA 94553); Abraham, S. *J Natl Cancer Inst* 56(2): 431-432; 1976.

1181 CELL SIZE AND MUTUAL CELL ADHESION. I. INCREASE IN MUTUAL ADHESIVENESS OF HELA CELLS FROM DENSITY-INHIBITED SUSPENSION CULTURES BY HYPOTONIC TREATMENT. (Eng.) Deman, J. J. (Academic Clinic, State Univ., Ghent, Belgium); Vakaet, L. C.; Bruyneel, E. A. *J Membr Biol* 26(2/3): 189-204; 1976.

1182 INCORPORATION OF LABELED GLUCOSAMINE INTO GLYCOPROTEINS BY ORGAN CULTURES OF HAMSTER TRACHEA: ADVERSE EFFECTS OF HEPES BUFFER. (Eng.) Daniel, P. F. (Eunice Kennedy Shriver Center Mental Retardation, Inc., 200 Trapelo Rd, Waltham, MA 02154); Wolf, G. *In Vitro* 11(6): 347-353; 1975.

1183 INHIBITION OF GROWTH RATE AND DEOXYNUCLEOSIDE TRIPHOSPHATE CONCENTRATIONS IN CULTURED LEUKEMIA L1210 CELLS. (Eng.) Lowe, J. K. (Cancer Res. Unit, Univ. Alberta, Edmonton, Alberta, Canada T6G 2E1); Grindey, G. B. *Mol Pharmacol* 12(1): 177-184; 1976.

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CARCINOGENESIS ABSTRACTS

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PREFACE

Carcinogenesis Abstracts is a publication of the National Cancer Institute. The journal serves as a vehicle through which current documentation of carcinogenesis research highlights are compiled, condensed, and disseminated on a regular basis. It represents an integral part of the Institute's program of fostering and supporting coordinated research into cancer etiology. Issues of *Carcinogenesis Abstracts* normally contain three-hundred abstracts and three-hundred citations (unaccompanied by corresponding abstracts). Abstracts and citations refer to the current scientific literature that describes the most significant carcinogenesis research carried on at the National Cancer Institute, other governmental agencies, and private institutions. *Carcinogenesis Abstracts* is intended to be a highly useful current awareness tool for scientists engaged in carcinogenesis research or related areas. The great number and diversity of publications relevant to carcinogenesis make imperative the availability of this service to investigators whose work requires that they keep abreast with current developments in the field.

Carcinogenesis Abstracts is normally published monthly. Volume XIV covers the scientific literature published from Jan 1976 through Dec 1976. To increase the usefulness of *Carcinogenesis Abstracts*, Volume XIV, a Wiswesser Line Notation index and a Chemical Abstracts Service Registry Number index have been provided. These indexes reference compounds described in abstracted articles. A cumulative subject, author, CAS Registry Number, and Wiswesser Line Notation index for Volume XIV will be published shortly after the final regular issue.

Carcinogenesis Abstracts is available free of charge to libraries and to individuals who have a professional interest in carcinogenesis. Requests for *Carcinogenesis Abstracts* from qualified individuals should include statements of their relationship to carcinogenesis research. All correspondence should be addressed as follows.

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The Secretary of Health, Education and Welfare has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through November 30, 1977.

NOTE

Journal names are abbreviated according to the list of abbreviations used by *Index Medicus*. For ournals not covered by *Index Medicus*, the abbreviations found in *Chemical Abstracts Service Source Index*, 907-1974 Cumulative, are used. New journals are verified in *New Serial Titles* and abbreviated according o *International Standard ISO 833*. An asterisk indicates the author to address (other than the primary) in equesting reprints.

LANGUAGE ABBREVIATIONS

Afr.	Afrikaans
Ara.	Arabic
Bul.	Bulgarian
Chi.	Chinese
Cro.	Croation
Cze.	Czech
Dan.	Danish
Dut.	Dutch
Eng.	English
Est.	Estonian
Fin.	Finnish
Fle.	Flemish
Fre.	French
Geo.	Georgian
Ger.	German
Gre.	Greek
Heb.	Hebrew
Hun.	Hungarian
Ice.	Icelandic
Ind.	Indonesian
Ita.	Italian
Jpn.	Japanese
Kor.	Korean
Lav.	Latvian
Lit.	Lithuanian
Nor.	Norwegian
Pol.	Polish
Por.	Portuguese
Rum.	Rumanian
Rus.	Russian
Ser.	Serbo-Croatian
Slo.	Slovak
Spa.	Spanish
Swe.	Swedish
Tha.	Thai
Tur.	Turkish
Ukr.	Ukrainian
Vie.	Vietnamese

ABBREVIATIONS USED IN ABSTRACTS

A	angstrom(s)
ACTH	adrenocorticotropic hormone
ADP	adenosine diphosphate
AMP	adenosine monophosphate
ATP	adenosine triphosphate
BCG	Bacillus Calmette Guerin
bid	twice daily
C	degrees centigrade
cal	calorie(s)
kcal	kilocalorie(s)
cc	cubic centimeter(s)
Ci	curie(s)
mCi	millicurie(s)
μCi	microcurie(s)
cm	centimeter(s)
CNS	central nervous system
cpm	counts per minute
dl	deciliter(s)
ml	milliliter(s)
μl	microliter(s)
DNA	deoxyribonucleic acid
ED_{50}	median effective dose
EDTA	ethylenediamine tetraacetic acid
ESR	erythrocyte sedimentation rate
g	gram(s)
kg	kilogram(s)
mg	milligram(s)
μg	microgram(s)
Hb	hemoglobin
hr	hour(s)
ia	intra-arterial
ic	intracerebral
icav	intracavitary
id	intradermal
ILS	increased life span
im	intramuscular
ip	intraperitoneal
ipl	intrapleural
it	intratumorous
IU	International Unit
iv	intravenous
K_m	Michaelis constant
LD	lethal dose
LD_{50}	median lethal dose
m	meter(s)
mm	millimeter(s)
M	molar
mM	millimolar
μM	micromolar
mOsm	milliosmolar
mEq	milliequivalents
min	minute(s)
mo	month(s)
MTD	maximum tolerated dose
N	normal concentration
NAD	nicotinamide adenine dinucleotide
NADH	reduced nicotinamide adenine dinucleotide
NADP	nicotinamide adenine dinucleotidephosphate
NADPH	reduced nicotinamide adenine dinucleotidephosphate
ng	nanogram(s) (10^{-9})
od	once daily
Pa	ambient pressure
PAS	periodic acid-Schiff
pg	picogram(s) (10^{-12})
pgEq	picogram equivalent
po	orally
ppb	parts per billion
ppm	parts per million
qid	four times daily
qod	every other day
QO_2	oxygen quotient
R	roentgen(s)
RBC	red blood cells (erythrocytes)
RNA	ribonucleic acid
sc	subcutaneous
sec	second(s)
SGOT	serum glutamic-oxalacetic transaminase
SGPT	serum glutamic-pyruvic transaminase
SRBS	sheep red blood cells
TCD	tissue culture dose
TCD_{50}	median tissue culture dose
tid	three times daily
U	unit(s)
mU	milliunit(s)
UV	ultraviolet
vol	volume
WBC	white blood cells (leukocytes)
wk	week(s)
wt	weight
x	times
yr	year(s)

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1201 CARCINOGENS IN DRINKING WATER. (Eng.) Miller, R. W. (No Affiliation Given). *Pediatrics* 57(4): 462-464; 1976.

Asbestos, the carcinogenic qualities of which when inhaled are considered the result of its physical properties, has been found in high concentrations in drinking water. On the other hand, animal studies have indicated that when asbestos is ingested, it is not carcinogenic. Human occupational exposure to asbestos, however, is associated with increased frequencies of gastrointestinal cancer, presumably from the swallowing of the compound. The high cancer mortality of whites in New Orleans is reported to be due to the presence of carcinogens in the water, despite the facts that the high cancer incidence is primarily in the lungs, women are less affected than men, and different communities with the same water supply show different effects. Vinylchlorides, pesticides, and polycyclic hydrocarbons are considered the most harmful. Chlorination leads to the formation of four carcinogens (chloroform, bromoform, bromodichloromethane, and dichloromethane). Chloroform is considered potentially the most dangerous, although no human correlations have been found. The fetus and child may be more susceptible than adults to these carcinogens. No basis for recommending changes in water supplies exists. (33 references)

1202 NOSE AND THROAT: OCCUPATIONAL HAZARDS. (Eng.) Bulteau, V. (R.P.A.H. Medical Centre, 100 Carillon Ave., Newton, N.S.W. 2042, Australia). *Med J Aust* 63(1/2): 27-28; 1976.

A brief review is presented of the occupational origins of irritation, allergic reaction and neoplasm in the nose and throat. A high incidence of adenocarcinoma of the ethmoidal region has been observed in furniture workers; exposure to hard woods and fine particles appears to be an important etiological factor in this occupation. Workers in the press and finishing departments of the footwear industry have also been shown to have an increased incidence of nasal cancer. In other industries, exposure to asbestos has been linked with an increased incidence of squamous cell carcinoma of the larynx, and exposure to nickel with an increased mortality from cancer of the nasal cavity. The latent period for many occupationally-derived neoplasms is so long (e.g., 50 yr) that the recognition of the carcinogenic properties of industrial irritants is often much delayed. (29 references)

1203 STEROID HORMONES. DISCRIMINANT FUNCTIONS AND CANCER. (Eng.) Forrest, A. P. M.; Buchan, R. In: *Medical Oncology: Medical Aspects of Malignant Disease*. Edited by K. D. Bagshawe. (Oxford: Blackwell Scientific Publications): pp. 125-141; 1975.

The relationship of the C21 (corticosteroids and progestagens), C19, and C18 steroid hormones to breast and prostate cancers was reviewed. In addition, the relationship of steroids to other cancers, i.e., endometrial cancer, renal carcinoma, and lung cancer, was briefly surveyed. Characteristic steroid excretion patterns, the influence of hormone receptor activity, sulfate ester formation, and the steroid synthesizing capacity of breast and prostate cancers were discussed in terms of prognosis and effective therapies. (108 references)

1204 AN APPROACH TO THE MECHANISM OF ANDROGEN ACTION. (Eng.) Baulieu, E.-E. In: *Host Environment Interactions in the Etiology of Cancer in Man. Proceedings of a Meeting Held at Primosten, Yugoslavia, 27 August-2 September 1972.* International Agency for Res. on Cancer and John E. Fogarty International Center of Natl. Insts. Health USA (Lyon, France): pp. 143-147; 1973.

Reports on the mechanism of androgen metabolism and transport are reviewed. One study on testosterone metabolism showed a ''17β-hydroxy pathway,'' along which there are the active metabolites androstanolone, dihydrotestosterone, 3α-androstanediol, and 3β-androstanediol. Substances that are involved in testosterone transport include corticosteroid-binding globulin and a sex steroid-binding plasma protein. A high-affinity, low-capacity, androstanolone-binding protein has been observed in ventral prostate cytosol; the sedimentation coefficient in low ionic strength Tris buffer and its reversible dissociation by potassium chloride into 4-5S subunits make it very similar to other steroid receptors. Other studies suggest that testosterone acts through different metabolic patterns in different target tissues. (37 references)

1205 ANDROGEN BINDING AND METABOLISM IN THE HUMAN PROSTATE. (Eng.) Attramadal, A. (Rikshopitalet, Oslo, Norway); Tveter, K. J.; Weddington, S. C.; Djoseland, O.; Naess, O.; Hansson, V.; Torgersen, O. *Vitam Horm* 33: 247-264; 1975.

Androgen binding and metabolism in the human prostate are reviewed, and results with neoplastic tissue are compared to those with nonneoplastic tissue. Both types of prostatic tissue contain at least two soluble androgen-binding proteins, as demonstrated by polyacrylamide gel electrophoresis, sucrose gradient analysis, Sephadex G-200 gel filtration, and Sephadex G-200 chromatography. One of these binding proteins has characteristics similar to those of the intracellular receptors in accessory sex organs of the male rat, while the other has properties similar to those of testosterone-binding globulin. No differences in physicochemical properties between the receptors from neoplastic and nonneoplastic tissues were demonstrated. Human prostatic tissue contains oxidative and reductive enzymes that act on testosterone. Reduction to 5α-dihydrotestosterone is carried on more rapidly in hyperplastic tissue than in prostatic cancer tissue. Further studies of receptor concentrations and of 5α-reductase activity in prostatic tissue might be of use in selecting patients for endocrine therapy. (16 references)

1206 BIOCHEMICAL ASPECTS OF THE ACTION OF ESTROGENS ON NORMAL COMPETENT TISSUES AND THE MECHANISM OF THEIR PARTICIPATION IN CARCINOGENESIS.

(Rus.) El'tsina, N. V. (Moscow, USSR). *Usp Sovrem Biol* 80(3(6)): 399-413; 1975.

Oncological literature was reviewed for findings on the receptor protein of steroid hormones in normal competent tissues, the interrelationship between receptor protein and chromatin protein, and early changes in the synthesis of RNA and protein of competent tissues in the presence of steroid hormone activity. Steroid hormones activate not random but specific sets of genes, which are connected primarily with the reinforcement of the RNA and protein synthesizing apparatus. Specificity in derepression of genes, reflected in the formation of specific sets of mitochondrial RNA populations, is also a characteristic of the action of the hormonal inducers on every competent tissue. The latest data on the molecular action of estrogens on normal tissue suggest that estrogens and possibly other steroid hormones, e.g., androgens, are not true carcinogens. Rather, they cause protracted proliferative processes in the tissue and represent essential factors in the pathogenesis of precancerous states. (82 references)

1207 ESTROGENS AND ENDOMETRIAL CARCINOMA (Letter to Editor).

(Eng.) Graham, R. M. (Heyman Lab., Cambridge, MA). *N Engl J Med* 294(15): 847; 1976.

Data are presented on 131 endometrial cancer patients, of whom only 9% had received exogenous estrogen. Familial cancer was more frequent in the estrogen-treated group (25%): apparently an increased risk is present if estrogen is given to women with more vulnerable genetic compositions. A time relation should be established in cases of possible endometrial cancer in which estrogens were previously administered. Endometrial carcinoma may occur after estrogen administration, but such cases should be distinguished from a reversible hyperplasia caused by hormonal stimulation. (2 references)

1208 GLYCOSPHINGOLIPID SYNTHESIS AND TUMORIGENESIS. A ROLE FOR THE GOLGI APPARATUS IN THE ORIGIN OF SPECIFIC RECEPTOR MOLECULES OF THE MAMMALIAN CELL SURFACE.

(Eng.) Richardson, C. L. (Dept. Biological Sciences, Purdue Univ., West Lafayette, IN 47907); Baker, S. R.; Moore, D. J.; Keenan, T. W. *Biochim Biophys Acta* 417(3/4): 175-186; 1975.

Surface membrane changes involving specific glycosphingolipids are consistently implicated in neoplasia, transformed cells having a simplified ganglioside pattern in comparison with untransformed controls. This has been shown to be the case for a number of different fibroblast cell lines after transformation by viruses, for chemically-induced hepatomas, and for spontaneously transformed hamster fibroblast and mouse cells. Such simplification by deletion of the more complex gangliosides has been shown to be caused by specific blocks in synthetic enzymes; e.g., the sialyl transferase that converts GM_1 to the GD_1a disialoganglioside in chemically-induced rat mammary carcinoma, and the UDP galactose:CM_2 galactosyl transferase in a cell line transformed by murine sarcoma virus. Other cell surface changes that occur after oncogenic transformation, such as the unmasking of cryptic haptens, may be related to these defects in ganglioside synthesis. The Golgi apparatus is the intracellular site at which carbohydrates are added to the glycosphingolipids. Cell surface functions regulated by gangliosides may therefore be dependent on Golgi apparatus functions. (94 references)

1209 FACTORS AFFECTING THE NATURAL INCIDENCE OF HEPATOMA IN MICE.

(Eng.) Grasso, P. (No affiliation given). *Food Cosmet Toxicol* 14(1): 63-65; 1976.

The variation in incidence of hepatoma among different mouse strains is reviewed along with the pertinent dietary, genetic, and environmental factors. The C3H strain is conspicuous for the highest incidence (18% to 100%) of hepatic nodular lesions, followed by the CBA strain, with incidences of 27% and 41%. The other strains have a reported incidence of only 5% or less. Tumor incidence does not maintain a steady level within the same strain, as shown by reports of increases in one strain over the years. In any one strain, males always have a higher incidence than females. Hormonal factors are probably responsible for the sex difference, but changes in the hormonal pattern of the adult animal have to be drastic in order to change natural incidence significantly. (However, there seems to be no sex difference in susceptibility to tumor induction by chemical carcinogens.) The hepatoma incidence increased considerably when the casein or fat content of the diet was increased. There is also a significant relationship between the Ay and Avy genes and hepatoma. Of the factors known to influence hepatoma induction, dietary protein is concluded to be the most important, followed by dietary fat and genetic factors. (19 references)

1210 EPIDEMIC OF HEPATITIS IN MAN DUE TO AFLATOXICOSIS.

(Eng.) Anonymous (No affiliation given). *Nutr Rev* 34(2): 45-46; 1976.

A summation of epidemiological studies suggests that the liver of humans is affected by aflatoxin. There is a correlation between primary liver cancer and aflatoxin exposure in Africa and Thailand. The symptoms of an epidemic in India were jaundice, rapidly developing ascites, portal hypertension, and a high mortality rate (many of which were due to massive gastrointestinal bleeding). Examination of the food showed that the maize was contaminated with *Aspergillus flavus* at 6.25 to 15.6 ppm. The epidemic was thus attributed to aflatoxin consumption despite the fact that neither aflatoxin B_1 nor its metabolites were found in either liver or urine samples; it was found in only two of seven serum samples. (These data may not be valid, because the time lag between maize consumption and sample collection is unknown). Histopathological examination showed extensive bile duct proliferation with periductal fibrosis and multinucleated giant cells. Men (sex ratio 2:1) and persons in age groups between 5 and 15 yr and over 30 yr were most afflicted. It would be pertinent to see if this community suffers from a high incidence of hepatoma in the future. (6 references)

1211 PRIMARY LIVER CANCER: ITS ETIOLOGICAL AND PATHOGENIC FEATURES. (Fre.) Aron, E. (Faculte de Medecine, Tours, France). *Ouest Med* 28(16): 1083-1087; 1975.

The etiological and pathogenic aspects of primary liver cancer (PLC) are reviewed. Since there is a strong correlation between PLC and cirrhosis of the liver, cirrhosis apparently induces a high PLC risk. This risk probably is not due to an extended evolution of the disease but rather to the corticoids and androgens used to treat it. Although the apparent racial, and thus genetic, predisposition (to black Africans) of PLC does not support the hypothesis that it is the result of carcinogenic factors (such as aflatoxin) in food, this possible cause cannot be discarded. Since the Australian antigen is frequently found in association with PLC, it too may be an oncogenic factor. Carcinogens such as dimethylaminobenzene and benzopyrene, which generally have extended induction times, are not detoxified but are metabolically activated by the hepatocytes. They then inhibit protein and RNA synthesis and perturb the regular mitotic process. The factors that stimulate mitosis in regeneration and in embryonic livers also stimulate tumor growth and so may be oncogenic. (11 references)

1212 THE MECHANISM OF THE MUTAGENIC ACTION OF HYDROXYLAMINES. (Eng.) Budowsky, E. I. (M. M. Shemyakin Inst. Bioorganic Chemistry, USSR Acad. Sciences, Moscow, USSR). *Progr Nucleic Acid Res Mol Biol* 16: 125-188; 1975.

Current knowledge concerning the mechanism of the mutagenic action of hydroxylamines is reviewed in detail. Mechanisms of the realization of point mutations involve template replication and repair processes as well as mutant selection. A definite mechanism involving recombinations has not been demonstrated. The mutagenic effect of the hydroxylamines in extracellular systems is discussed in terms of the reagents used, the modification of nucleic acids and nucleoprotein components, the functional properties of the hydroxylamine-modified nucleoside residues, and the genetic consequences of the action of hydroxylamines in nonmetabolizing systems. The residues formed in polynucleotides on treatment with hydroxylamines fall into four groups: 6-substituted dihydropyrimidine residues, polynucleotide-protein linkages, N^4-hydroxycytidine residues, and N^6-hydroxy- and N^6-methoxyadenosine residues. The mutagenic action of the hydroxylamines is considered in metabolizing and nonmetabolizing systems. The wide variation in genetic consequences of the action of mutagens results from the nature of the subject, its functional and physical state, and the conditions of mutagenesis. (207 references)

1213 CARCINOGENIC N-NITROSO COMPOUNDS. (Pol.) Palut, D. (Zaklad Toksykologii Sanitarnej Panstwowego Zakladu Higieny, 00-791 Warsaw, ul. Chocimska 24, Poland). *Rocz Panstw Zakl Hig* 27(1): 89-98; 1976.

Literature on nitrosyl group binding by amines and amides, the biological metabolism of carcinogenic N-nitroso compounds, and the possibility of their synthesis in animals from precursors in the environment is reviewed. Research on carcinogenic N-nitroso compounds, conducted on a broad basis since the 1960's, has shown that many of their derivatives induce neoplasms when introduced po, ipl, id, or parenterally; they attack various organs and tissues in most animals. Studies of the dependence between chemical structure and the type of induced neoplasm have indicated carcinogenic effects on the liver (most symmetrical dialkylnitrosamines), esophagus, and kidneys (some nonsymmetrical nitrosamines), among other organs. Nitroso compounds can be classified as indirect carcinogens, including N-nitrosoamines, and direct ones, including N-nitrosoamides (derivatives of urea, thiourea, and carbamic acid). The compounds appear in the atmosphere as synthetic derivatives produced by the chemical industry or as incidental residues. Findings from in vitro experiments on their biosynthesis in animals from precursors in the environment have been confirmed by in vivo studies involving the feeding of sodium nitrite and various amines and amides to laboratory animals. Experimental administration of noncarcinogenic diphenylamine and sodium nitrite to 31 humans showed that the nitroso derivative was present in gastric contents. (39 references)

1214 CARCINOGENIC EFFECTS OF DRUGS IN MAN. (Eng.) Fraumeni, J. F. In: *Carcinogenesis Testing of Chemicals. Proceedings, Conference on Carcinogenesis Testing in the Development of New Drugs, May 23-25, 1973, Washington, D.C.* CRC Press, Inc. (Cleveland, OH): pp. 51-54; 1974.

A number of drugs that have been implicated as carcinogens in man are discussed. Radioisotopes have been related to an increased risk of acute leukemia (^{32}P), osteosarcoma, or sinus carcinoma (radium and mesothorium) and liver hemangioendothelioma (Thorotrast). Patients treated with immunosuppressive agents have a 35 times normal expectation for developing lymphoma, 350 times higher rate of reticulum-cell sarcoma, and 4 times higher rate of skin and lip cancers. Cytotoxic agents such as chlornaphazine are often carcinogenic in laboratory animals and may induce cancer in man. Synthetic estrogens (stilbestrol), exogenous androgens (oxymetholone, methyltestosterone derivatives), inorganic arsenic compounds, large doses of analgesic drugs containing phenacetin, diphenylhydantoin, chloramphenicol, and coal-tar and creosote preparations may also have carcinogenic potential. (31 references)

1215 SHORT-TERM TESTS FOR CARCINOGENESIS: TESTS INVOLVING INDUCTION OF NEOPLASIA. (Eng.) DiPaolo, J. A. In: *Carcinogenesis Testing of Chemicals. Proceedings, Conference on Carcinogenesis Testing in the Development of New Drugs, May 23-25, 1973, Washington, D.C.* CRC Press, Inc. (Cleveland, OH): pp. 91-94; 1974.

The usefulness of in vitro models for studies of chemically induced carcinogenesis is discussed. The following established facts lead to the conclusion that these studies are valuable: (a) transformation can be quantitated; (b) transformation follows a linear relationship with dose; (c) transformed colonies produce transformed lines with attributes of neoplastic cells, including the production of tumors; and (d) in vivo activity correlates with in vitro activity. (18 references)

1216 IS LUTEAL INSUFFICIENCY CARCINOGENIC? (Fre.) Kuttenn, F. (Hopital de la Salpetriere, 47, boulevard de l'Hopital, 75634 Paris Cedex 13, France); Mauvais-Jarvis, P. *Prog Med* 103(5): 135-138; 1975.

Literature concerning progesterone, which stimulates secretion in the target tissues prepared by estrogens, is reviewed. A luteal insufficiency causes a progesterone insufficiency that in turn causes hyperestrinism, dystrophy, and dysplasia. Genetic cancers in women may be the result of either hormone maintenance or the loss of hormones. (Surgical excision of the gonad is the treatment of choice.) The latter possibility, which has yet to be proved, is supported by epidemiology in that endometrial cancer and mastopathies appear most often in women with extended progesterone insufficiency. Statistically, women with extended progesterone-deficient premenopausal states, women who were first pregnant after the age of 35, and women who have a genetic hormonal deficiency are high-risk factors for breast cancer. Animal experiments have also supported the progesterone insufficiency theory--gonadectomized mice treated with progesterones or cyclic estrogens did not have as high an incidence of gonadal cancer as nontreated or continuously treated ones. Although evidence for this theory is not conclusive, it should be retained, since cyclic progesterone treatment of progesterone insufficiencies is not dangerous. (15 references)

1217 THE CHEMICAL EFFECTS OF NUCLEIC ACID ALKYLATION AND THEIR RELATIONSHIP TO MUTAGENESIS AND CARCINOGENESIS. (Eng.) Singer, B. (Dept. Molecular Biology, Univ. California, Berkeley, CA). *Prog Nucleic Acid Res Mol Biol* 15: 219-284; 1975.

The chemistry of nucleic acid alkylation is reviewed in detail. The reaction of alkylating agents with individual nucleosides (guanosine, adenosine, cytidine, uridine, and thymidine) is discussed. UV absorption spectra have been particularly useful in identifying these compounds; the spectral data for a large number of derivatives are presented. The sites of chemical modification of the bases of single- and double-stranded polynucleotides are discussed. In the case of alkylated RNA or ribopolynucleotides, the observed lability of the chain is not due to depurination to a significant extent, and it is assumed that phosphotriesters are formed. Studies on the properties of polymers containing alkylated bases deal with secondary structure, base-pairing interactions, and template and messenger functions. The chemistry of DNA alkylation differs from that of RNA alkylation only qualitatively, since in double-stranded DNA some positions are hydrogen-bonded and alkylated only as the double-stranded structure is denatured during the reaction and in those segments that exist in a single-stranded form. The in vivo reactivity of the N-7 of guanine of cellular DNA and RNA with alkylating agents has long been known, but more recently data on additional products have been obtained. Point mutation can result from modification of both the N-3 of cytidine and the O^6 of guanosine, and a molecular mechanism for mutagenesis by alkylation can thus be postulated. The major product of alkylation has been shown to base-pair normally, indicating that the process, as such, is not mutagenic. In chemical terms, mutation probably results only from specific base modifications, and all other effects of alkylation may be primarily lethal. A lack of quantitative correlation between mutagenicity and carcinogenicity indicates that this is neither the only nor the predominant mechanism for carcinogenesis. Some changes in metabolic functions produced by in vivo alkylation are mentioned. (198 references)

1218 THE BIOLOGY OF CANCER. (Eng.) Braun, A. C. (Reading, MA: Addison-Wesley): 169 pp.; 1974.

The biology of cancer is examined in broad, nonspecialized terms, and an attempt is made to identify the essential biological concepts that underlie the tumorous state and to evaluate critically the premises upon which current oncologic thought is based. Emphasis is placed on the cellular mechanisms that affect the development and growth of tumors. Specific topics include: regulation of the normal cell cycle, the development of autonomy in plant and animal cells, and the ability of cancer cells to invade and metastasize; heritable cellular changes that underlie the tumorous state, such as somatic mutation, the deletion of cellular components, and chromosomal abnormalities; oncogenic DNA and RNA viruses; reversal of the tumorous state in plants (exemplified by the Crown Gall disease, Kostoff genetic tumors, and habituation) and animals (exemplified by Lucke adenocarcinoma of the frog, tetratocarcinoma of the mouse, and epidermoid carcinoma in animals and man); reversal of the malignant state in humans; substances that regulate the cancer phenotype; and differences between normal and tumor cells that may be exploited therapeutically, including biochemical approaches, methods for preventing the action of chemical carcinogens, immunological approaches, interferons, the chalones, etc. (159 references)

1219 EXPERIMENTAL MYELOFIBROSIS. (Eng.) Hunstein, W. (No affiliation given). *Clin Haematol* 4(2): 457-478; 1975.

Various methods of inducing myelofibrosis in experimental animals are described. These methods include: experimental infarction and mechanical trauma, the injection of myelotoxic agents such as saponin and lead acetate, whole-body irradiation followed by the transplantation of allogenic marrow cells in rats, viral infection, and the repeated injection of foreign protein. All the stimulatory insults result in myelonecrosis and the development of necrotic tissue. However, the marrow reconstitutes following the removal of the noxious agents, except in the cases of viral infection and irradiation plus allogenic cell transplantation. These latter models are therefore the most appropriate for the study of myelofibrosis in man, in whom the disease is a self-perpetuating process. (62 references)

1220 MORPHOLOGICAL AND PRACTICAL ASPECTS OF PATHOLOGY OF MITOSIS. (Rus.) Alov, I. A. (Inst. Human Morphology, Acad. Medical Sciences USSR, Moscow, USSR). *Arkh Patol* 37(12): 3-14; 1975.

The pathology of mitosis plays a crucial role in the emergence of mutations and of aneuploidy, in neoplastic cell transformation, and, ultimately, in the differential diagnosis of benign and malignant processes. Pathological mitoses can be classified according to their connection with chromosomal damage or with damage to the mitotic apparatus, or on the basis of the disturbance of the dissociation of nuclear and cytoplasmic changes. The various disturbances of the normal mitotic course are not stable. Combined forms of pathology are encountered frequently. Pathological mitoses are met in normal tissues but are much more typical in pathological processes. They occur under the effects of drugs (e.g., some sulfamides, caffeine, heparin, pentobarbital), radiation, and viral infection and, particularly, during neoplastic processes. The mitotis in malignant tumors and precancerous hyperplasias studied to date is characterized by increased mitotic activity, delayed division in the metaphase stage, and sharply increased pathological mitoses (although pathological mitoses are nonspecific for the formation of malignancies). (93 references)

1221 SOMATIC MUTATION IN BIOLOGIC RESEARCH. (Eng.) Nichols, W. W. (Inst. Medical Res., Camden, NJ). *Hereditas* 81(2): 225-236; 1975.

Experimental evidence relevant to the significance of somatic mutation as a mechanism of carcinogenesis and aging is reviewed. The findings that virtually all chemical carcinogens tested were found to mutate *Salmonella* bacteria in the presence of activating mammalian microsomal enzymes lends very strong support to the proposition that somatic mutation is the principal mechanism of carcinogenesis by chemicals. Two mutations in one cell may be necessary to initiate carcinogenesis; patients who suffer from the hereditary-type of retinoblastoma may have inherited one such mutation and therefore have been at an increased risk of cancer initiation by environmental agents able to generate one further mutation in a number of their cells. Viral material in cells may also act to produce one of the necessary mutational events. Human fibroblast cells exhibit a finite lifespan in culture and senescent cells display many cytogenetic abnormalities. Senescence could be due to the gradual accumulation of mutations rendering the cells incapable of function. Mutational events are probably involved in the initiation of malignancy and have a possible involvement in cell aging phenomena. (62 references)

1222 HOST-CELL REACTIVATION OF IRRADIATED HUMAN ADENOVIRUS. (Eng.) Rainbow, A. In: *Molecular Mechanisms for Repair of DNA.* Edited by P. C. Hanawalt; R. B. Setlow. (New York: Plenum Press): 753-754; 1974.

Evidence concerning the host-cell reactivation (HCR) of irradiated animal virus was summarized. HCR was seen for simian virus 40, herpes simplex virus, pseudorabies virus and adenovirus. HCR expresses, at least partly, the repair mechanisms of the host cell. Excision-repair may account for at least some of the virus repair in normal human cells. Caffeine lowers the survival of UV-irradiated herpes simplex and adenovirus. Because caffeine does not affect cellular repair replication, but does inhibit postreplication repair, another repair mechanism may also be involved in the survival of UV-irradiated viruses in normal human fibroblasts. Incubation of adenovirus-infected human KB cells in the presence of caffeine, hydroxyurea, or fluorodeoxyuridine at concentrations having no effect on cellular repair replication resulted in the inhibition of the repair of UV-induced alkali-labile lesions, suggesting that the removal of such lesions reflects a postreplication type of repair. The repair of single-strand breaks in viral DNA was detected in human KB cells infected with γ-irradiated adenovirus. The number of completely repaired viral DNA molecules correlated with the plaque-forming ability of the virus and suggested that repair leads to restoration of the biological expression of the viral DNA. The repair of single-strand breaks in viral DNA was inhibited by hydroxyurea and actinomycin D at concentrations that have no effect on the repair of single-strand breaks in cellular DNA. It is suggested that there is a postreplication repair mechanism in the host cell. (14 references)

1223 PROSPECTS FOR BIOLOGIC AND PHARMACOLOGIC INHIBITION OF RIBONUCLEIC ACID TUMOR VIRUSES. (Eng.) Smith, R. G. (Lab. Tumor Cell Biology, Natl. Cancer Inst., Bethesda, MD 20014);

Gallo, R. C. *Biochem Pharmacol* 25(5): 491-495; 1976.

Leukocytes from patients with acute myelogenous leukemia contain RNA virus that is similar to the woolly monkey sarcoma virus. The life cycle, replication, and mechanisms of transformation of these tumor viruses are discussed as possible sites of viral inhibition by biological and pharmacological inhibitors. The transcription of proviral DNA from viral genomic RNA is a prime target for inhibition since this pathway of information transfer is not known to occur in normal cells. Integration of viral DNA, synthesized by viral reverse transcriptase, into the host genome can be blocked with ethidium bromide, thus blocking transformation of cells and viral production. Viral RNA is synthesized by transcription of proviral DNA, and once initiated continues in stationary as well as dividing cells. Therefore, to inhibit naturally occurring oncogenesis in animals, the role of the virus in replication and transformation must be elucidated. The strategy of interference with oncogenesis depends on host-virus relationships--relationships that vary depending on the species studied. No selective, potent pharmacologic inhibitors of any viral functions have been found. Most of the inhibitors that have been described are toxic to cells or animals. The authors discuss the feasibility of viral inhibition at various stages in animal and cell life-cycles and the treatments that are currently used for viral inhibition. They conclude that these treatments, with the exception of a rifamycin derivative, are not specific and therefore interfere with cellular functions. (61 references)

1224 THE GROWTH OF NORMAL AND NEOPLASTIC CELLS. (Eng.) Stoker, M. G. P. (Imperial Cancer Res. Fund Labs., Lincoln's Inn Fields, London, England). *Clin Radiol* 27(1): 1-7; 1976.

The control of normal and neoplastic cell growth is reviewed. The normal cell cycle is discussed, and the role of the cell surface at various times during the cell cycle is explored. It is suggested that for a brief period during the normal cycle there is a receptive state or window for sensing the environment before another round of the cycle is begun. Several structures and functions are altered in tumor cells. The membrane structures include lectin sites, membrane fluidity, LETS glycoprotein, fucose glycoprotein, glycolipid chain length, and new antigens (Forssman, fetal, and tumor-specific). Membrane functions that are altered include transport mechanisms for phosphate, nucleoside, sugar, and amino acids; adenyl cyclase, ATPase, and protease activation; and adhesion to substrate. Other general alterations in the neoplastic cells are morphology and arrangement, contact inhibition of movement, phosphofructokinase activity, and cAMP and cGMP. A fundamental characteristic of the transformed cell is that it does not depend on a stimulatory signal from the environment. Whether this signal comes from within the cells and is always present has not yet been fully elucidated, but preliminary evidence indicates that transformed cells do produce active materials that replace the usual serum growth factors for normal cell growth. An essential difference of the transformed cell is the apparent lack of a G_0 phase. At present, all known anticancer drugs act on normal growing cells as well, but not resting ones. A new approach to chemotherapy, therefore, might be to attempt to inhibit normal cell growth during intensive chemotherapy. Knowledge of growth regulation in normal cells is of obvious importance. (10 references)

1225 THE IMPORTANCE OF CYCLIC AMP IN CELLULAR TRANSFORMATION. (Eng.) Johnson, G. S. In: *Cyclic Nucleotides in Disease*. Edited by B. Weiss. (Baltimore: Univ. Park Press): pp. 35-44, 1975.

The cyclic nucleotide adenosine 3',5'-monophosphate (cyclic AMP) was examined as a possible central control locus for viral-induced transformations of cells in tissue culture (mouse cells, human diploid fibroblasts, rat kidney NRK cells, and chick embryo cells). Rapid decreases in cyclic AMP levels preceded transformation, and cyclic AMP levels in confluent cells were lower in transformed than in normal cells. Adenylate cyclase activity is altered by transformation, but the effects are inconsistent in several systems. Many cellular properties influenced by cyclic AMP are altered by transformation. Increases in cyclic AMP levels by cyclic AMP analogs and phosphodiesterase inhibitors restore most of these to normal. Elevated cyclic AMP levels do not cause the growth of transformed cells to decrease at confluency. Also, the NAD+/NADH ratio and the abnormal glycolipid pattern of transformed cells is unaffected by cyclic AMP. (12 references)

1226 IS THIS THE ORIGINAL CANCER GENE? (Eng.) Anonymous (No affiliation given). *New Sci* 69(955): 71; 1976.

The "tumor gene" of the RNA tumor viruses of chickens may have mutated from a normal gene counterpart. This gene, called sarc, upon which the malignant transformation of cells depends, is not related to the previously found endogenous viruses. Its existence was proved in experiments in which labeled DNA representing sarc was matched with sequences in chicken cells from which all non-sarc sequences had been removed. These sequences are not unique to chickens but are present in many other birds. As genetic distance from the chicken increases, the sarc DNA sequence becomes increasingly obscure. The original gene possibly functioned in both normal embryonic development programming and nonviral cancer. As further evidence of its existence, the quail sarc-like sequence is transcribed into RNA in a chemically induced tumor. However, there are several RNA viruses that do not cause solid tumors and do not carry sarc but can still transform cells in culture. Nor has any sarc-like gene been identified in the DNA tumor viruses, which apparently transform cells via a DNA-binding protein. (2 references)

1227 THE VIRAL ETIOLOGY OF LEUKEMIA. (Eng.) Levine, P. H. (Natl. Cancer Inst., Landow Building, Room C306, Bethesda, MD 20014); Gravell, M. *Mod Probl Pediatr* 16: 137-166; 1975.

The various researches on the viral etiology of leukemia are summarized. The leukemogenicity of type C RNA viruses for a wide range of vertebrate species suggests that similar viruses are responsible for human leukemia. In model animal systems, leukemia viruses can be transmitted vertically (from parent to offspring through the gametes) or horizontally (by environmental exposure). The mode of transmission of putative human leukemia viruses remains speculative. A number of variables, including dose and strain of virus, host genetics, and age at time of virus exposure, influence whether animals will develop leukemia. Epidemiological and laboratory studies also indicate that similar factors are probably involved in human leukemia. Furthermore, an RNA-directed DNA polymerase has been detected in acute myeloid leukemia cells which cross-reacts immunologically with a similar enzyme found in a primate type C virus, woolly monkey sarcoma virus. Putative human leukemia viruses have not been isolated, possibly because they are defective and, thus, cannot replicate autonomously. The recent finding of endogenous xenotropic type C viruses, however, provides another explanation for the inability to isolate a human leukemia virus. Viruses responsible for human leukemia may be xenotropic and replicate only in permissive foreign host cells. Endogenous type C viruses possibly function in normal cellular processes. Horizontally transmissible oncogenic viruses of animals may have evolved from endogenous viruses by mutation. Although a human leukemia virus has not been isolated, many factors imply that the type C virus is involved. Molecular hybridization techniques have evidence of nucleic acids with some homology to type C virus. C virus-like particles have been observed in human plasma pellets; type C virus-like transcriptase and other cross-reacting type C virus-like antigens have been associated with human leukemic leukocytes. (172 references)

1228 VIRUS INFECTIONS. (Eng.) Stevens, D. A. (Santa Clara Valley Medical Center, San Jose, CA); Merigan, T. C. *Int J Radiat Oncol Biol Phys* 1(3/4): 317-320; 1976.

The association of virus infections with particular cancer types parallels the association of impaired cellular immunity with susceptibility to virus. The incidence of herpes zoster and the rate of dissemination are high at times of maximal disturbance in cellular immunity for Hodgkin's disease and many other lymphomas. Although studies have indicated that humoral immunity is intact, a delayed appearance of herpes zoster antibody, which could not be detected by the studies, has been found. Cytomegalovirus is particularly associated with cancer. Leukemia patients are very susceptible to virus infections. The infections are also associated with immunosuppressive drugs. Steroids may affect immunoglobulin production, delayed hypersensitivity, and interferon production. Although the mechanism by which immunosuppression causes severe virus diseases is unknown, impairment of delayed hypersensitivity and delay in antibody production are apparently involved. Rapid recall of interferon response may be a function of the immune state. A delay in local interferon appearance may be associated with impaired ability to handle infection. (18 references)

1229 TRANS-MEMBRANE CONTROL OF THE RECEPTORS ON NORMAL AND TUMOR CELLS. II. SURFACE CHANGES ASSOCIATED WITH TRANSFORMATION AND MALIGNANCY. (Eng.) Nicolson, G. L. (Dept. Cancer Biology, Salk Inst. Biological Studies, San Diego, CA 92112). *Biochim Biophys Acta* 458(1): 1-72; 1976.

The altered properties and components of the surfaces of tumor cells (transformed in vivo and grown in vivo) and of transformed cells (transformed in vitro or in vivo and grown in vitro) were reviewed. Changes in surface composition, surface enzymology, and cellular transport as well as other surface modifications are discussed. The dynamics of surface receptors on normal and transformed cells were compared in relation to lectin receptors (distribution, mobility, and effect on cell agglutination), tumor-associated surface antigens, and surface modifications during the cell cycle and at cell contact. The relationship of these surface antigens to tumor development was discussed, specifically: (a) host immunity to tumors, including humoral (antitumor antibodies) and cell-mediated (cytotoxic killing by T-derived cells, killing by antibody-dependent killer cells, or killing by specifically ''armed'' macrophages) immunities; and (b) tumor escape from host immune rejection (loss of sensitivity to cytotoxic killing by surface antigen modulation and antigen loss, shedding of surface antigens and the presence of soluble factors blocking immune destruction, and tumor enhancement by immunostimulation). (778 references)

1230 CELL SURFACE PROTEINS AND MALIGNANT TRANSFORMATION. (Eng.) Hynes, R. O. (Dept. Biology, Massachusetts Inst. Technology, Cambridge, MA 02139). *Biochim Biophys Acta* 458(1): 73-107; 1976.

Transformation associated changes in cell surface proteins [large, external, transformation-sensitive (LETS) glycoprotein, fibroblast surface antigen, myosin and proteins of similar size, collagen, 140,000-145,000 molecular wt proteins, actin and proteins of similar size, and 80,000-100,000 molecular wt proteins] are reviewed. Proteins that are increased may be virally coded and those that are decreased may represent indirect effects of the transforming gene. Kinetics of changes in surface proteins have been studied in several systems, e.g., LETS protein, Z, Ω, and Δ proteins, and the 73,000 and 95,000 molecular wt proteins in chick embryonic fibroblasts. Alterations in levels of surface proteins in normal cells were also discussed, with relation to growth stimulation, location, and effects of transformation. Several working hypotheses are presented that provide a molecular description of the cell surface and of transformation-associated changes: (a) fluid mosaic model for the arrangement of proteins in membranes, (b) proteolysis of and interaction of other proteins with actin microfilaments, (c) alterations in adhesion by reduction in surface proteins responsible for adhesion, and (d) surface complexes affecting cellular morphology and functional relationships. (167 references)

1231 ALPHA-FETOPROTEIN. (Eng.) Lau, H. L. (Sch. Medicine, Johns Hopkins Univ., 725 North Wolfe St., Baltimore, MD 21205); Linkins, S. E. *Am J Obstet Gynecol* 124(5): 533-554; 1976.

The synthesis and secretion into maternal serum of alpha-fetoprotein (AFP) by the developing fetus is a normal feature of pregnancy. However, the appearance of AFP in the blood, urine, cerebrospinal or ascitic fluids at other times indicates a pathological condition, such as hepatoma, tumors containing elements of embryonal origin such as hepatoblastomas and teratoblastomas, certain other neoplasms, acute viral hepatitis or hepatic necrosis. In nonmalignant disease the elevation may be due to viral injury; e.g., the presence of hepatitis B antigen has been reported in all cases of cirrhosis with high levels of AFP. Elevated levels of AFP occur in the serum of 50-75% of all hepatoma cases. This frequency has been found to depend on geographical location, age (younger patients have higher levels than older patients) and sex (more male than female patients are positive). Patients with poorly differentiated tumors have the highest AFP levels (32 mg/100 ml), those with well differentiated lesions have intermediate levels (25 mg/100 ml) and those with anaplastic lesions the lowest levels (16 mg/100 ml). Immunofluorescent techniques have demonstrated that only a small proportion (5-20%) of cells in particular tumors contain AFP. Synthesis occurs during the G_1 phase of the cell cycle, with release from the cell in the G_2 phase. The production of AFP by Yoshida sarcoma cells in vitro was stimulated by cyclic adenosine monophosphate. A mode of specific therapy against tumor cells that secrete AFP is suggested by the finding that the injection of human AFP or chemically-modified rabbit AFP into rabbits stimulates the immune response of the rabbits to their own endogenous AFP. (224 references)

1232 THE CARCINO-EMBRYONIC ANTIGENS OF HUMAN DIGESTIVE CARCINOMAS. (Eng.) Burtin, P. In: *Host Environment Interactions in the Etiology of Cancer in Man. Proceedings of a Meeting Held at Primosten, Yugoslavia, 27 August-2 September 1972.* International Agency for Res. on Cancer and John E. Fogarty International Center of Natl. Insts. Health USA. (Lyon, France): pp. 301-305; 1973.

Cellular immunology and immunochemical studies of the role of carcinoembryonic antigen (CEA) in human digestive carcinomas are reviewed. The role of tumor-associated antigens and CEA, both present in gastrointestinal cancers, is not yet known, nor is their relationship to each other. The current evidence suggests that CEA does not play a role in the delayed type reactions demonstrated in the patient against his own tumor. The CEA assay is positive in about 70%-80% of colonic cancers, but this decreases to less than 50% in incipient carcinomas. It is thus concluded that this assay is presently of little diagnostic value. (24 references)

1233 IMMUNOLOGICAL PRINCIPLES IN CANCER. (Eng.) Burk, M. W. (Univ. Minnesota, Minneapolis, MN); McKhann, C. F. *Clin Neurosurg* 21: 352-361; 1974.

There is evidence that most human neoplasms are characterized in part by distinct tumor-specific antigens which are capable of eliciting an immunological response in the cancer patient. However, in spite of the presence of immune lymphoid cells that should be capable of destroying the neoplastic cells in question, tumors are able to grow progressively and kill their hosts. The serum from patients with progressively growing tumors is frequently able to ''block'' the cytotoxicity that immune lymphocytes display towards autochthonous tumor cells in vitro, and the further addition of serum from ''cured'' patients whose tumors have been successfully excised can ''unblock'' the cytotoxicity of the lymphocytes; it is quite likely that the blocking factor in the serum of tumor patients is antigen-antibody complex and that the unblocking factor of ''cured'' patients is free antibody. The site of the blocking activity seems to be at the surface of the tumor cells. Some tumors can block lymphocyte cytotoxicity by releasing soluble antigen into the serum; in this case the target of inhibition appears to be the immune lymphocyte itself. The knowledge that patients have some immunity towards their own tumors, despite a general depression in immune responsiveness, has stimulated the search for ways of increasing the effectiveness of this immunity. Promising in this regard is the finding that histologically similar human tumors share common antigens, which may be purified and utilized in a variety of diagnostic and immunotherapeutic approaches. (25 references)

1234 THE ROLE OF CELLULAR IMMUNITY IN NEOPLASIA. (Eng.) Glade, P. R. (Univ. Miami Sch. Medicine, Miami, FL); Zaldivar, N. M. *Pediatr Res* 10(5): 517-522; 1976.

Clinical evidence for a role of immune mechanisms in cancer development and control derives from a variety of sources, most of which have to do with the increased incidence of cancer in patients with defective or suppressed immunosurveillance. Those who have undergone prolonged immunosuppressive therapy for any reason have a (100 times) greater incidence of cancer than normal individuals. Direct evidence has been demonstrated for in vivo and in vitro cell-mediated responses to a variety of tumor-associated antigens. Evidence has been developed that the tumor-bearing host can recognize neoplastic changes and respond in immunologic ways. Several immunologic mechanisms have been implicated in failures of immunosurveillance. The presence of tumor-associated carcinoembryonic antigen has been observed in the serum of patients with ulcerative colitis and granulomatous colitis, as well as in patients with cancer of the colon. The incidence of cancer is higher in ulcerative colitis than in Crohn's disease, and leukocyte migration inhibition by meconium ''antigen'' was present in 93% of patients with granulomatous colitis, as compared with 3% in normal individuals, 14% in patients with bowel adenocarcinoma, and 31% in patients with ulcerative colitis. Nonspecific immunostimulation with BCG and other agents has been shown to be associated with antitumor activity in a variety of animal models as well as in the clinic. The role of transfer factor has also been extensively studied. Cancer immunotherapy and preventive immunization may be realities when the specific and protective immune responses, in the cancer patient and in the general population, that deserve restoration or augmentation are sorted out. (95 references)

1235 EPIDEMIOLOGY AND ASSAYS FOR CARCINOEMBRYONIC ANTIGEN(S): A COMMENT. (Eng.) Zamcheck, N. In: *Host Environment Interactions in the Etiology of Cancer in Man. Proceedings of a Meeting Held at Primosten, Yugoslavia, 27 August-2 September 1972.* International Agency for Research on Cancer and John E. Fogarty International Center of Natl. Insts. Health USA. (Lyon, France): pp. 329-330; 1973.

Some of the clinical uses and limitations of the present assay for carcinoembryonic antigen (CEA) are briefly summarized. Although there is presently no assay system that permits the detection of digestive tract cancer at a stage early enough to guarantee surgical cure in all cases, the CEA assay is useful when the findings are considered in the context of all other clinical and laboratory information. The assay appears to be the best available method for recognizing pancreatic cancer. (3 references)

1236 THYROID CARCINOMA. (Eng.) DeGroot, L. J. (Billings Hosp., Chicago, IL). *Med Clin North Am* 59(5): 1233-1246; 1975.

The etiology, pathology, clinical presentation, course, diagnosis, and management of thyroid carcinoma are reviewed. Although the etiology is far from being completely understood, previous radiation exposure and prolonged hyperplasia induced by continuous exposure to thyroid-stimulating hormone have been linked to the occurrence of this tumor. The majority (60%-70%) are the slow-growing papillary types. Other differentiated pathological types are follicular, mixed follicular and papillary, and medullary. The usual presentation is an incidentally discovered lump in the neck. Papillary carcinoma has a peak incidence in the third and fourth decades, is slow growing, and remains in the thyroid for long periods of time. The prognosis is especially good. Follicular carcinoma has a peak incidence in the fifth decade, is slow growing, but is more invasive and more lethal. Medullary carcinomas may occur independently or as part of a phenotype that includes medullary cancer, parathyroid adenomas, pheochromocytomas, and mucosal neuromas or neurofibromatosis. Biopsy is the most reliable diagnostic technique. Widely divergent opinions exist as to the proper clinical management of thyroid cancer, largely because it is slow growing and many years are required for the collection of meaningful data. Therapy has included surgery (the degree of which depends on the extent and nature of disease), thyroid suppression, radiotherapy, and radioactive iodine therapy. (30 references)

1237 TEILUM'S TUMOR OF THE ENDODERMAL SINUSES. (Fre.) Gaillard, J. (Centre Hospitalier, F 27000 Evreux, France). *Nouv Presse Med* 4(40): 2889; 1975.

Teilum's tumor, contrary to the prevailing belief, is not a simple teratoma. The secretion of α-fetoprotein by the tumor reinforces the hypothesis that it is of endodermal origin, a ''yolk-sac'' tumor. The fundamental histological aspects of these tumors are found in the proliferations that form on the vitelline sacs of the embryoid forms during dislocation. Endodermic sinus tumors are vitelline ''entomesoblastomas'' of which the final histological image depends on the maturity of the angiogenic tissues and on the correlation between the state of this tissue and the vascular reaction of the stroma. The perivitelline mesoblast may be of entoblastic origin. (1 reference)

1238 CURRENT ANATOMOPATHOLOGICAL CLASSIFICATION OF CARCINOIDS, THEIR HISTOCHEMICAL AND ULTRASTRUCTURAL ASPECTS. (Fre.) Berger, G. (Hopital Cardiovasculaire, BP Lyon Montchat, 69394, Lyon Cedex 3, France). *Rev Med* 16(30): 2077-2078, 2080, 2082, 2084-2086; 1975.

The macro- and microscopic characteristics and the clinical, local, histopathological, and ultrastructural traits of carcinoids with and without an affinity for silver salts are surveyed. The polypeptide hormones secreted by the digestive endocrine cells, the Amine Content Precursor Uptake and Decarboxylation (APUD) of APUDome carcinoids, and atypical carcinoids are also reviewed. The APUDome carcinoids do not have the endocrinous architecture, eventual serotonin secretion, and reductive evolution of the traditional carcinoid. Instead, they have neurosecretory granules, a varied functional spectrum in the APUD scale, and a malignant potential associated with the tumor or its secretion. Carcinoids are either anatomoclinical entities corresponding to regional specialization (such as a serotonin-form carcinoid of the small intestine or an insulin-form nesidioblastoma) or numerous basically functional tumors whose diversity prohibits classification. Carcinoids possibly arise from the neural crest and may thus constitute the endocrinine side of the ''neurophomas.'' (43 references)

1239 PATHOLOGIC ASPECTS OF MUCOSAL LESIONS OF THE MAXILLARY SINUS. (Eng.) van Nostrand, A. W. P. (Dept. Pathology, Univ. Toronto, 100 College St., Toronto, Ontario MG5 1L5, Canada); Goodman, W. S. *Otolaryngol Clin North Am* 9(1): 21-34; 1976.

A review is presented of the histology and physiology of normal and pathologically disordered mucosa of the maxillary sinus. Malignant neoplasms derived from the mucosal lining of the nose and the paranasal sinuses constitute about 15% of all malignant tumors involving the upper respiratory tract. Of these, 80-90% are squamous cell carcinomas or undifferentiated carcinomas considered to be of squamous cell origin. Etiological factors are difficult to identify, but many patients have had long histories of chronic sinusitis, and metaplasia of the respiratory epithelium lining to one of squamous type probably plays a significant role in the development of malignancy. Men are afflicted twice as often as women, and nearly all patients are over the age of 40. The overall five year survival rate in patients with undifferentiated and squamous tumors is 25-30%, the best results being obtained with combined radiotherapuetic and surgical approaches. Primary adenocarcinomas of the maxillary sinus are uncommon and their etiology is also unknown, except for the high incidence of antroethmoidal adenocarcinoma in the Bantu, which is probably related to the use of carcinogenic snuff,.and the occurrence of primary adenocarcinoma in workers in the hardwood furniture industry. (5 references)

1240 SURFACE AND CHROMOSOMAL ALTERATIONS IN LIVER CELLS FOLLOWING NEOPLASTIC TRANSFORMATION IN VITRO. (Eng.) Borek, C. In: *Host Environment Interactions in the Etiology of Cancer in Man. Proceedings of a Meeting Held at Primosten, Yugoslavia, 27 August-2 September 1972.* International Agency for Res. on Cancer and John E. Fogarty International Center of Natl. Insts. Health USA. (Lyon, France): pp. 297-299; 1973.

The previously reported neoplastic transformation of epithelial cells from differentiated liver into hepatomalike cells under conditions of nutritional stress is described. A cloned line of differentiated epithelial cells from the normal liver of a Buffalo rat was exposed to the effects of depleted medium, products of their own metabolism, lowered pH, and anoxia for 6 wk. Isolated foci of refractile cells that formed a second layer over the parental cells in a manner similar to that of hepatoma cells maintained epitheloid morphology and continued to manufacture serum proteins. They did, however, lose much of their former glucose-6-phosphatase activity, became aneuploid, and developed altered surface membrane microstructural changes, which appeared similar to those reported for transformed fibroblasts. The demonstration of cell transformation by nutritional stress appears to have implications for some kinds of in vivo malignancies. (12 references)

1241 CHROMOSOME PATTERNS IN BENIGN AND MALIGNANT TUMORS IN THE HUMAN NERVOUS SYSTEM. (Eng.) Mark, J. In: *Chromosomes and Cancer.* Edited by J. German. (New York: Wiley): pp. 481-495; 1974.

Chromosome patterns in benign and malignant tumors in the human nervous system are surveyed, with emphasis placed on a specific study of 50 cases of astrocytic malignant gliomas. In that study, 75% of the gliomas had diploid or near diploid S-numbers, and those with near tetraploid S-numbers were more than twice as common as those with a near triploid S. The karyotype analyses revealed no case with a normal diploid S. Most tumors showed extensive deviations in the normal chromosome groups (A-C), and markers were found in almost 75% of the cases. Analysis of the real relation between the cytogenic changes and the clinical and pathological parameters revealed that the age and sex of the patient were factors. Gliomas with a pseudodiploid S were most likely to appear early, whereas those with hyperdiploid and tetraploid stemlines tended to develop in older patients. There was a correlation between the male sex and three tumor qualities: development of hyperdiploid stemlines, a parietal location, and a long period of symptoms prior to operation. The possible relation between chromosomal observations and clinical and pathological manifestations was discussed for other tumors originating in the nervous system (oligodendrogliomas, ependymomas, medulloblastomas and neuroblastomas, retinoblastomas and optical gliomas, neurinomas, and pituitary adenomas) and for metastases. (15 references)

1242 CHROMOSOME ABNORMALITIES AND PREDISPOSITION TOWARDS CANCER. (Eng.) Harnden, D. G. (Medical Sch., Univ. Birmingham, Birmingham B15 2TJ, England). *Proc R Soc Med* 69(1): 41-43; 1976.

The available evidence supports the idea that chromosome changes are important as predisposing factors for the initiation of malignancy, and may also be important for the progression of tumors. Predisposition to malignancy is observed in patients with chromosome breakage syndromes such as Fanconi's anemia, in which breakage occurs at random, Bloom's syndrome, in which there are frequent chromatid exchanges between identical loci on homologous chromosomes, and ataxia telangiectasia, in which chromosomal rearrangements occur as the result of breakage throughout the karyotype but with particular frequency at locus 14q13. Ataxia telangiectasia is characterized by the appearance of clones of cytogenetically distinct lymphoid cells that have a rearrangement involving at least one chromosome no. 14. Malignancies may arise from within pre-existing clones that already have proliferative advantages. Similar clones of lymphocytes with abnormal chromosomes have been reported in subjects exposed to ionizing radiations, and clones of abnormal fibroblasts have been observed both in patients with chromosome-breakage syndromes and in apparently normal individuals. Furthermore, chromosome rearrangement, as opposed to chromosome breakage, is a characteristic of virus-cell interactions that frequently lead to cellular transformation, and chemical carcinogens may also induce chromosomal aberrations. Such aberrations have been shown in lymphocytes from workers exposed to vinyl chloride. Chromosomal damage, whether elicited by chemical, physical, viral, or inherited genetic factors, may predispose to malignancy, but the induction of damage does not mean that malignancy will necessarily ensue. (23 references)

1243 EPIDEMIOLOGY OF CARCINOMA OF THE STOMACH. (Pol.) Staszeski, J. (Instytut Onkologii, 44-101 Gliwice, ul. Wybrzeze Armi Czerwonej 15, Poland). *Nowotwory* 25(4): 273-279; 1975.

The author discusses the prevalence of stomach carcinoma by country, population group, and type of tumor as well as the factors determining its appearance. Stomach carcinoma constituted the major cause of deaths from neoplasms in Poland among men and women, but its incidence has been falling for 10 yr. It is observed more frequently in men, and its incidence increases with age. Japan, Iceland, certain regions of South America, and the Soviet Union, and Central and Western Europe demonstrate the greatest prevalence of this disease, and Australia, Canada, and the United States, the lowest. Epidemiologic observations on the connection of stomach carcinoma with blood groups and on family incidence underline the dependence of disease on genetic factors. The importance of nutrition as a basic environmental factor in the epidemiology of this carcinoma is widely known, but attempts to isolate specific differences in the food consumption of unaffected and affected individuals have been unsuccessful. (38 references)

1244 CARCINOGENICITY TESTS (Letter to Editor). (Eng.) Rubin, H. (Dept. Molecular Biology, Univ. California, Berkeley, CA 94720). *Science* 191(4224): 241; 1976. (11 references)

1245 INDUSTRIAL HAZARDS DUE TO VINYL CHLORIDE. (Fre.) Hublet, P. (Ecole de Sante publique de la Faculte de medecine, Universite libre de Bruxelles, rue Belliard 100, 1040 Brussels, Belgium). *Arch Belg Med Soc* 33(2): 73-89; 1975. (68 references)

1246 XENOBIOTICS AND MOLECULAR TERATOLOGY. (Eng.) Sonntag, A. C. (Dept. Obstetrics-Gynecology, Univ. New Mexico, Albuquerque, NM). *Clin Obstet Gynecol* 18(4): 199-207; 1975. (21 references)

1247 LEGAL DECISIONS AND OPINIONS IN POLLUTION CASES. (Eng.) Hills, J. P. (Messenger, Lynch, Hills and Miller, Attorneys and Counselors at Law, Beltsville, MD 20705). *Environ Sci Technol* 10(3): 234-238; 1976. (No references)

1248 REPORT OF DISCUSSION GROUP NO. 2. DIETS. (Eng.) Newberne, P. M. In: *Carcinogenesis Testing of Chemicals. Proceedings, Conference on Carcinogenesis Testing in the Development of New Drugs, May 23-25, 1973, Washington, D.C.* CRC Press, Inc. (Cleveland, OH): pp. 17-20; 1974. (24 references)

1249 REPORT OF DISCUSSION GROUP NO. 3. DOSE SELECTION AND ADMINISTRATION. (Eng.) Friedman, L. In: *Carcinogenesis Testing of Chemicals. Proceedings, Conference on Carcinogenesis Testing in the Development of New Drugs, May 23-25, 1973, Washington, D.C.* CRC Press, Inc. (Cleveland, OH): pp. 21-22; 1974. (No references)

1250 REPORT OF DISCUSSION GROUP NO. 4. INCEPTION AND DURATION OF TESTS. (Eng.) Tomatis, L. In: *Carcinogenesis Testing of Chemicals. Proceedings Conference on Carcinogenesis Testing in the Development of New Drugs, May 23-25, 1973, Washington, D.C.* CRC Press, Inc. (Cleveland, OH): pp. 23-27; 1974. (32 references)

1251 REPORT OF DISCUSSION GROUP NO. 5. INCLUSION OF POSITIVE CONTROL COMPOUNDS. (Eng.) Weisburger, J. H. In: *Carcinogenesis Testing of Chemicals. Proceedings, Conference on Carcinogenesis Testing in the Development of New Drugs, May 23-25, 1973, Washington, D.C.* CRC Press, Inc. (Cleveland, OH): pp. 29-34; 1974. (21 references)

1252 APPENDIX A TO REPORT OF DISCUSSION GROUP NO. 5. POSITIVE CONTROLS IN ENVIRONMENTAL RESPIRATORY CARCINOGENESIS. (Eng.) Hoffmann, D.; Wynder, E. L. In: *Carcinogenesis Testing of Chemicals. Proceedings, Conference on Carcinogenesis Testing in the Development of New Drugs, May 23-25, 1973, Washington, D.C.* CRC Press, Inc. (Cleveland, OH): pp. 35-39; 1974. (5 references)

1253 REPORT OF DISCUSSION GROUP NO. 10. METABOLIC ACTIVATION AS A FACTOR IN CARCINOGENIC RESPONSE. (Eng.) Nebert, D. In: *Carcinogenesis Testing of Chemicals. Proceedings, Conference on Carcinogenesis Testing in the Development of New Drugs, May 23-25, 1973, Washington, D.C.* CRC Press, Inc. (Cleveland, OH): pp. 75-78; 1974. (No references)

1254 THE OESTROGEN-BINDING PROPERTIES OF α-FOETOPROTEIN: PRELIMINARY RESULTS AND APPLICATIONS. (Eng.) Uriel, J. In: *Host Environment Interactions in the Etiology of Cancer in*

Man. Proceedings of a Meeting Held at Primosten, Yugoslavia, 27 August-2 September 1972. International Agency for Res. on Cancer and John E. Fogarty International Center of Natl. Insts. Health USA (Lyon, France): pp. 311-315; 1973. (5 references)

1255 INTERPRETATION OF TEST RESULTS IN TERMS OF CARCINOGENIC POTENTIAL TO THE TEST ANIMAL: THE REGULATORY POINT OF VIEW. (Eng.) D'Aguanno, W. D. In: *Carcinogenesis Testing of Chemicals. Proceedings, Conference on Carcinogenesis Testing in the Development of New Drugs, May 23-25, 1973, Washington, D.C.* CRC Press, Inc. (Cleveland, OH): pp. 41-44; 1974. (9 references)

1256 REPORT OF DISCUSSION GROUP NO. 14. CRITERIA OF NEOPLASTIC TRANSFORMATION. (Eng.) Pitot, H. In: *Carcinogenesis Testing of Chemicals. Proceedings, Conference on Carcinogenesis Testing in the Development of New Drugs, May 23-25, 1973, Washington, D.C.* CRC Press, Inc. (Cleveland, OH): pp. 113-114; 1974. (4 references)

1257 RECENT THOUGHTS ON THE DEVELOPMENT OF COLORECTAL CANCER. (Eng.) Corman, M. L. (Lahey Clinic Foundation, 605 Commonwealth Ave., Boston, MA 02215); Veidenheimer, M. C.; Coller, J. A. *Med Clin North Am* 59(2): 347-362; 1975. (57 references)

1258 TUMORS OF THE STOMACH. (Fre.) Bouvresse, M. (Hopital Cochin, 75013 Paris, France). *Rev Med* 16(35): 2349-2357; 1975. (6 references)

1259 RECENT ADVANCES IN CYTOGENETICS AND THEIR RELEVANCE TO MEDICINE. (Eng.) Robinson, J. A. (Western General Hosp., Edinburgh EH4 2XU, Scotland). *Proc R Soc Med* 69(1): 33-38; 1976. (22 references)

1260 COMMENTS ON SEZARY SYNDROME. (Eng.) Zucker-Franklin, D. In: *Advances in the Biosciences 12. Schering Symposium on Immunopathology, Cavtat, Yugoslavia, May 28 to June 1, 1973.* International Committee of Immunopathology/ World Health Organization. (Pergamon Press): pp. 209-212; 1974. (1 reference)

1261 DISCUSSION PAPER: THE ROLE OF CYTOGENETICS IN MUTAGENESIS TESTING. (Eng.) Hirschhorn, K. (Mount Sinai Sch. Medicine, City Univ. New York, New York, NY 10029). *Ann NY Acad Sci* 269: 12-15; 1975. (9 references)

1262 CELL-MEDIATED IMMUNITY TO TUMOR ANTIGENS AS STUDIED IN VITRO. (Eng.) Hellstrom, K. E.; Hellstrom, I. In: *Proceedings of the American Philosophical Society.* Held at Philadelphia for Promoting Useful Knowledge. American Philosophical Society. (Philadelphia, PA): vol. 120, pp. 93-99; 1976. (20 references)

1263 IMMUNOLOGICAL STATUS AND CARCINOGENESIS. (Rus.) Gorelik, L. S. (Inst. Genetics and Cytology, of the Acad. Sci. of the USSR, Minsk, USSR). *Usp Sovrem Biol* 80(2): 270-286; 1975. (112 references)

1264 IMMUNOGLOBULIN ABNORMALITITES IN PLASMA-CELL LEUKEMIA (Letter to Editor). (Eng.) Hyun, J. (Saint Francis Hosp., 114 Woodland St., Hartford, CT 06105). *Am J Clin Pathol* 65(3): 419; 1976. (5 references)

1265 LYMPHOCYTES AND CELLS IN MALIGNANT TRANSFORMATION. SIMILARITIES AND POSSIBLE RELATIONSHIP BETWEEN THE TWO CELL TYPES. (Eng.) Kast, R. E. (Immunology Lab., Statens Seruminstitut, Copenhagen, Denmark). *Oncology* 32(3-4): 175-189; 1975. (52 references)

1266 VIRUS-INDUCED ANTIGENS -- A REVIEW. (Eng.) Klein, G. In: *Oncogenesis and Herpesvirus II. Part 1: Biochemistry of Viral Replication and in vitro Transformation. Proceedings of a Symposium held in Nuremberg, Federal Republic of Germany, 14-16 October 1974.* International Agency for Research on Cancer. (Lyon, France): IARC Scientific Publications No. 11, pp. 293-308; 1975. (67 references)

1267 THE EFFECT OF AFLATOXINS ON THE INCORPORATION OF RNA AND PROTEIN PRECURSORS BY ISOLATED HEPATOCYTES. (Eng.) McIntosh, P. R. (Natl. Cancer Inst., Natl. Insts. Health, Bethesda, MD 20014); Evans, I. H.; Rabin, B. R. *Br J Cancer* 33(4): 440-449; 1976.

The role of metabolic activation in the inhibition of RNA synthesis by aflatoxin B_1 in isolated hepatocytes was studied using an inhibitor of the mixed function oxidases, diethylaminoethyldiphenyl-n-propylacetate (SKF 525A). Hepatocytes prepared by a simplified enzymatic technique were active in the incorporation of RNA and protein precursors into acid-insoluble material. The incorporation of RNA precursors was markedly inhibited by low levels (1×10^{-7} M) of aflatoxin G_1 and aflatoxin B_1 but not by aflatoxin B_2 or aflatoxin G_2. The activity of mixed function oxidases (MFO) could be suppressed in these cells by SKF 525A or stimulated by NADPH. SKF 525A caused a reduction in the inhibition by aflatoxin B_1 of the incorporation of RNA precursor into macromolecules. This finding suggests that a metabolite of aflatoxin B_1 is an actual inhibitor of RNA synthesis in the cells. Measurement of lactate dehydrogenase activity showed these cells to be leaky on incubation at 37 C and thus not suitable for studies of protein secretion.

1268 ON THE PRECOCIOUS INDUCTION OF α_1-FOETOPROTEIN BY SEVERAL HEPATOCARCINOGENS, INCLUDING AFLATOXIN B_1, IN RATS. (Eng.) Kroes, R.; Williams, G. M.; Weisburger, J. H. In: *Host Environment Interactions in the Etiology of Cancer in Man. Proceedings of a Meeting Held at Primosten, Yugoslavia, 27 August-2 September 1972.* International Agency for Res. on Cancer and John E. Fogarty International Center of Natl. Insts. Health USA. (Lyon, France): pp. 307-309; 1973.

The dose-dependency of the induction of α_1-fetoproteins (AFP) in the serum of Fischer rats within a short time after treatment with 3'-methyl-4-dimethylaminoazobenzene (3'-MDAB) and other liver carcinogens is reported. At 1,200 mg/kg of 3'-MDAB in the diet, AFP was detected as early as 2 wk after the carcinogen regime was begun. With 300 mg/kg of 3'-MDAB, AFP appeared after 4-5 wk, and, instead of remaining elevated, declined to undetectable levels 3-4 wk later, even though carcinogen remained in the diet. Similar results were obtained with 2'-methyl-4-dimethylaminoazobenzene, N-fluorenylacetamide, and aflatoxin B_1. It is suggested that it may be useful to apply AFP assay as a rapid means of testing chemicals for hepatocarcinogenicity.

1269 MYCOTOXIN PRODUCING-POTENTIAL OF MOLDS ISOLATED FROM CHEDDAR CHEESE. (Eng.) Bullerman, L. B. (Dept. Food Science and Technology, Univ. Nebraska, Lincoln, NB 68503); Olivigni, F. J. *J Food Sci* 39(6): 1166-1168; 1974.

Samples of Cheddar cheese obtained from retail outlets were analyzed for molds and the ability of such molds, during growth in artificial media, to produce material toxic to fertile chicken eggs or *Bacillus megaterium*. Mold counts for grated surface cheese were assessed in potato dextrose agar plates incubated at 5 C for 6 wk or at 21 C for 3 to 5 days. The counts varied widely among samples of the same commercial brands and between different brands, and ranged from undetectable levels to 3,380 colonies/g of surface material after 5 C incubation and from 6 to 3,500 colonies/g after 21 C incubation. Most of the toxic activity associated with molds grown in culture media was ascribed to the *Penicillium* and *Aspergillus* genera. Of the *Penicillium* colonies tested, 29.5% produced material toxic to chick embryos and 21.6% produced material toxic to *B. megaterium*. Similarly, 47.8% of the aspergilli were obtained from plates incubated at 5 C, suggesting that in cheese stored by refrigeration, molds of the genus *Penicillium* are of the greatest potential concern. The cheese samples were not tested for toxicity; toxic activity was detected in pure cultures of organisms from the cheese.

1270 AMMONIATION OF AFLATOXIN B_1: ISOLATION AND CHARACTERIZATION OF A PRODUCT WITH MOLECULAR WEIGHT 206. (Eng.) Cucullu, A. F. (Agricultural Res. Service, U.S. Dept. Agriculture, New Orleans, LA 70179); Lee, L. S.; Pons, W. A., Jr.; Stanley, J. B. *J Agric Food Chem* 24(2): 408-410; 1976.

An investigation was made of the nature of the products of the ammoniation of the potent carcinogen, aflatoxin B_1, under conditions of elevated temperature and pressure (1 or 3 hr at 100 C) similar to those proposed for the detoxification of mold-damaged oilseed meal. Reactions were conducted by use of 4 mg portions of aflatoxin B_1 with 3 ml of concentrated ammonium hydroxide in a 22-ml Parr bomb for 1 or 3 hr at 100 C. Mass spectra of the chloroform-soluble fractions revealed residual aflatoxin B_1, the previously identified aflatoxin D_1, masses of 229, 243, and 257 attributable to fragmentation of D_1, and a molecular ion mass of 206. This compound was identified as dihydro-4-hydroxy-6-methoxyfuro[2,3-b]benzofuran, a non-fluorescent phenol which retains the difuran moiety but lacks both the lactone carbonyl and the cyclopentenone ring characteristic of aflatoxin B_1.

1271 CARCINOGENIC ACTIVITY OF SYNTHETIC ASBESTOS. (Rus.) Pylev, L. N. (Inst. Experimental and Clinical Oncology, Acad. Medical Sciences, USSR Moscow, USSR); Koval'skaia, G. D.; Iakovenko, G. N. *Gig Tr Prof Zabol* (10): 31-35; 1975.

The carcinogenic effect of the hydrothermally obtained synthetic chrysotile and Na,Mg-hydroxyamphibole on 125 rats was studied histologically. Threefold ipl administration of chrysotile to 64 animals in doses of 20 mg each had a weak carcinogenic effect; some premesotheliomal changes were observed, and diffuse irregular hyperplasia of the pleural mesothelium was slightly more frequent.

Administration of 60 mg of Na,Mg-hydroxyamphibole caused a somewhat greater percentage of premesotheliomal changes, and pleural mesotheliomas were seen in 54.5% of cases. The weaker carcinogenic effect of synthetic asbestos than of natural asbestos may be due to the absence of various trace metals in the synthetic. However, the high carcinogenicity of Na-Mg-hydroxyamphibole indicates the significance of its basic structure in the mechanism of its effect. The morphological picture of premesotheliomal changes and pleural tumors was similar to that found in experiments with natural asbestos.

1272 LIGHT MICROSCOPE STUDIES ON THE EFFECTS OF CHRYSOTILE ASBESTOS AND FIBER GLASS ON THE MORPHOLOGY AND RETICULIN FORMATION OF CULTURED LUNG FIBROBLASTS. (Eng.) Richards, R. J. (Depts. Biochemistry and Anatomy, Univ. Coll., P.O. Box 78, Cardiff CF1 1XL, U. K.); Jacoby, F. *Environ Res* 11(1): 112-121; 1976.

The effects of chrysotile asbestos and fiberglass on the morphology and reticulin formation of cultured Dutch rabbit lung fibroblasts were investigated in vitro by light microscopy. Dust samples were added to 24-hr cultures as a single application of 50 μg/0.2 ml of medium. At 3 or 4 days, the chrysotile-treated cultures showed a number of severe morphological alterations: the cell population was heavily decimated; there were focal areas of cellular debris and extracellular dust fibers and degenerating cells with pyknotic nuclei; and there were great cellular polymorphism and considerable variation in nuclear size. Nucleolar abnormalities amounted to almost 100% at day 3. Renewed growth and recovery of the culture occurred, but the subsequent deposition of reticulin was atypical. Fiberglass caused little cell destruction; it produced similar morphological changes, but to a much lesser degree. This study confirms that chrysotile asbestos alters the growth pattern by its initial cytotoxic effect, the delay and alteration of the mitotic pattern of the cells, and the greater frequency of binucleate cells. Both dusts cause similar but different degrees of morphological changes and alterations in reticulin deposition in lung fibroblast cultures.

1273 CYTOPHOTOMETRIC MEASUREMENT OF THE DNA CONTENT OF ATYPICAL GLIO-MESENCHYMAL ELEMENTS AT THE LATE STAGES OF CHEMICAL BLASTOMOGENESIS OF ALBINO RAT CEREBELLUM. (Rus.) Kazantseva, I. A. (Inst. Human Morphology, Acad. Medical Sciences USSR, Moscow, USSR); Iablonovskaia, L. Ia. *Biull Eksp Biol Med* 80(10): 96-99; 1975.

DNA content was determined by comparative microspectrophotometry in albino rats in atypical gliomesenchymal elements around the villous capsule surrounding a 7,12-dimethylbenz(a)anthracene (DMBA) pill and in cells of microastrocytoma and microglioblastoma induced by DMBA. Measurements were made 63-362 days from the onset of the experiment. The glio-mesenchymal proliferation surrounding the pill was characterized by an overwhelming (83%) predominance of diploid and near-diploid cells and a relatively small amount of cells with DNA content, triploid cells, and near-triploid cells. Atypical glial proliferations also showed a marked predominance (69.5%) of diploid and near-diploid cells, with an increased number of near-triploid cells. In protoplasmatic astrocytoma, the number of near-diploid cells decreased to 59%, and near-triploid cells rose to 32%. Expressed aneuploidy and polyploidy were noted only in microglioblastoma. The data indicate the preservation of a distinct diploid modal class in the late stages of this type of chemical blastomogenesis of the albino rat cerebellum, except when malignancy has occurred in the early stages of tumor growth.

1274 EFFECT OF AMINO ACIDS AND INDUCERS ON THE ACTIVITY OF THE MICROSOMAL MONO-OXYGENASE SYSTEM IN RAT LIVER CELL CULTURE. (Eng.) Paine, A. J. (MRC Toxicology Unit, MRC Lab., Woodmansterne Rd., Carshalton, Surrey, England). *Chem Biol Interact* 13(3/4): 307-315; 1976.

The nutritional factors that control the activities of benzpyrene hydroxylase and NADPH cytochrome *c* reductase were studied in rat liver cell culture. Both 1,2-benzanthracene (17.5 μM, 18-24 hr) and phenobarbitone induced (2 mM, 18 hr) induced the activity of benzpyrene hydroxylase, but only phenobarbitone increased NADPH cytochrome *c* reductase activity. Benzpyrene hydroxylase activity, in contrast to that of NADPH cytochrome *c* reductase, depended on the amino acid concentration of the culture medium in a similar manner to the regulation of the hepatic hydroxylase activity by dietary protein intake in the whole animal. Of all the amino acids present in the culture medium, only tryptophan induced benzpyrene hydroxylase when added singly to the medium. However, tryptophan also induced the activity of the reductase, suggesting that its inducing effect is unrelated to raising the concentration of all the amino acids of the culture medium. It is proposed that tryptophan may only be an inducer, because the cells have low levels of tryptophan pyrrolase activity.

1275 TUMORS OF THE PILOSEBACEOUS UNIT INDUCED IN THE RAT BY THE INTRAVENOUS ADMINISTRATION OF 7,12-DIMETHYLBENZ[a]ANTHRACENE. (Eng.) Bennington, J. L. (Children's Hosp., 3700 California St., San Francisco, CA 94119); Holmes, E. J.; Combs, J. W. *J Invest Dermatol* 66(3): 183-187; 1976.

The production of skin tumors in rats by iv injection of 7,12-dimethylbenz[a]anthracene (DMBA) was described. Six of 70 female Sprague-Dawley rats given a single iv injection of DMBA developed seven pilosebaceous tumors. Two of the tumors showed differentiation toward the upper portion of the pilosebaceous unit while five showed differentiation toward the lower portion. Each tumor was examined histochemically for the presence of inner root sheath keratin of the hair follicle using the carbamido diacetyl reaction for citrulline, and for hair shaft keratin, using boiling ninhydrin reagent. The two tumors of the upper portion of the pilosebaceous unit were sebaceous adenomas which were accompanied by a keratinizing epithelium like that of the sebaceous gland duct and upper pilosebaceous canal. Histochemically, the keratin was not like that of hair shaft or inner root sheath. The five tumors showing differentiation toward components of the lower pilosebaceous unit were trichoepitheliomas. They were composed of structures which, to varying degrees, recapitulated the organization of the normal hair follicle. Within these follicular structures, both inner root sheath and hair shaft type keratins were found. The occurrence of skin tumors after the iv administration of DMBA was unexpected; it is uncommon for skin tumors to be produced by the systematic administration of chemical carcinogens and they have never been described after the oral administration of DMBA. That the route of administration may influence tumor production with this carcinogen is suggested; the only other reported tumors, which were squamous carcinomas, also followed iv injection of DMBA.

1276 MITOCHONDRIAL FUNCTIONAL CHANGES DURING HEPATIC HYPERPLASIA AND AZO DYE CARCINOGENESIS. (Eng.) Higgins, E. S. (Medical Coll. Virginia, Virginia Commonwealth Univ., Richmond, VA 23298); Rogers, K. S.; Marks, P. A. *Chem Biol Interact* 13(3/4): 295-305; 1976.

Resting and active-state respiratory velocities, respiratory control, high amplitude volume changes, and latent ATPase activities were examined in hepatic mitochondria from Holtzman strain Sprague-Dawley rats fed 3'-methyl-4-dimethylaminoazobenzene (3'MeDAB, 8 wk) for production of liver tumors and from rats in three phases of liver generation subsequent to subtotal hepatectomies. Tetrabutylammonium bromide, a lipophilic probe capable of selectively inhibiting phosphorylating oxidation or uncoupling oxidation from phosphorylation, was used to detect subtle alterations in lipophilicity characteristics of the organelles. It was concluded that mitochondria from prehyperplastic, hyperplastic, and neoplastic tissues had a higher than normal degree of membrane lipophilicity at specific functional sites. Control of respiration by ADP was markedly augmented in all experimental groups; this behavior, plus depressed sensitivity to swelling agents and energized contraction, were similar in mitochondria from hepatomas and from 3-day regenerating livers. These mitochondrial functions were even more pronounced, however, in cells in prehyperplastic states (6 and 16 hr subsequent to partial hepatectomy). Many orms of liver damage result in mitochondrial alterations that elevate the capacity for oxidative hosphorylation. Such changes associated with nduction of azo dye oncogenesis are mimicked by he degree of hyperplasia in the tissue following he first mitotic wave of regeneration; ions relevant to hepatocarcinogenesis are disussed.

1277 PYRUVATE KINASE ACTIVITY IN THE LIVER OF RATS WITH INDUCED HEPATOMA. (Rus.) Gorban, G. P. (Kiev. Inst. Nutritional Hygiene, Ukrainian SSR Ministry Public Health, Kiev, USSR). *Biull Eksp Biol Med* 80(12): 34-36; 1975. The activ-

The activity of pyruvate kinase (PK) and its isozymes was studied in the liver of rats with macroscopically visible tumors induced by p-dimethylaminoazobenzene. The activity of M-isozyme (the hepatic form of PK) increased in the liver of all experimental rats. The activity of L-isozyme (the much more thermolabile muscular form) decreased in the liver of rats with tumors that were given 0.1 mg F-/kg but did not change in other cases. A reliable difference in M-isozyme activity was observed among experimental animals that did not receive sodium fluoride (NaF) and those that received 1.5 mg F-/kg ($p < 0.01$). NaF surplus caused relatively decreased M-isozyme activity in the liver of rats in this group. The observed capacity of NaF to inhibit in vivo M-isozyme PK activity may be associated with the capacity of NaF in vivo to prevent the increase in the rate of glycolysis in the liver in the later stages of carcinogenesis, a finding reported previously.

1278 STIMULATION OF CELLULAR INGESTION BY BASIC PROTEINS IN VITRO. (Eng.) Westwood, F. R. (Central Toxicology Lab., Imperial Chemical Industries, Ltd., Alderley Park, Nr Macclesfield, Cheshire, England); Longstaff, E. *Br J Cancer* 33(4): 392-399; 1976.

The effect of histone, poly-L-lysine, and methylated bovine albumin on the uptake of carbon and benzpyrene (BP) particles was investigated in vitro in Wistar rat peritoneal macrophages, baby hamster kidney fibroblasts (BHK-21), and mouse L-cells. Protein was added in a concentration of 100 μg/ml. Histone and polylysine significantly enhanced the ingestion of carbon and BP by the macrophages, fibroblasts, and L cells. Methylated bovine albumin did not significantly stimulate carbon or BP uptake relative to untreated control cultures. The incubation of carbon particles with histone before inclusion in the macrophage cultures resulted in the same degree of uptake as in cultures in which carbon and histone were added independently of each other. The protein may be coating the particles and in this way aiding its transport into the cell.

1279 RAT LIVER MICROSOME-MEDIATED BINDING OF BENZO(a)PYRENE METABOLITES TO DNA. (Eng.) Thompson, M. H. (Inst. Cancer Res., Nightingales Lane, Chalfont St. Giles, Bucks., HP8 4SP, England); King, H. W. S.; Osborne, M. R.; Brookes, P. *Int J Cancer* 17(2): 270-274; 1976.

Individual metabolites of benzo(a)pyrene were isolated from rat liver microsomal incubation of the parent hydrocarbon, and subsequently bound to

DNA in separate incubations with microsomes. Of the metabolites examined, the greatest binding resulted with 7,8-dihydro-7,8-dihydroxybenzo(a)pyrene (BP-7,8-diol); the binding of the benzo(a)pyrene phenols was about 50% that of the 7,8-diol. Analysis of the hydrocarbon-deoxyribonucleoside derivatives obtained by enzymic degradation of these DNA samples revealed that the binding of BP-7,8-diol was accounted for mainly by a single product identical to one of the products obtained from DNA with bound benzo(a)pyrene. The microsome-induced binding of benzo(a)pyrene phenols to DNA yielded mainly a single product identical in chromatographic behavior to the major product derived from benzo(a)pyrene when bound to DNA during incubation with microsomes. The results suggest that the DNA binding that occurs when benzo(a)pyrene is metabolized by a liver microsomal system is the result of the reaction with the DNA of a further metabolite of initially formed phenols and BP-7,8-diol.

1280 ENZYMATIC CONJUGATION OF BENZO(A)PYRENE OXIDES, PHENOLS, AND DIHYDRODIOLS WITH UDP-GLUCURONIC ACID. (Eng.) Nemoto, N. (Natl. Cancer Inst., Bethesda, MD 20014); Gelboin, H. V. *Biochem Pharmacol* 25(10): 1221-1226; 1976.

The enzymatic conjugations of the phenol, dihydrodiol, and epoxide metabolites of benzo(a)pyrene (BP) to glucuronides have been measured. Rat liver microsomal fractions were incubated with uridine diphosphate (UDP)-glucuronic acid and the various water-soluble metabolites of BP. The reactions were mediated by microsomal bound enzymes whose activities were decreased drastically by treatments with protease or Triton X-100 but slightly increased with trypsin. Various mechanisms for these results are explained. Fifteen oxygenated metabolites and derivatives of BP were shown to conjugate to glucuronic acid to various degrees. The 7,8-diol-9,10-oxide was found to be most active in binding DNA and 3500- to 4000-fold more mutagenic than BP or BP-4,5-oxide. The 7,8-diol precursor of 7,8-diol-9,10-oxide was most actively converted to a mutagen by mammalian systems. These results suggest that a specific form of the diol oxide may be the active carcinogenic form of BP. The glucuronidation pathway may, therefore, be important as a determinant of polycyclic hydrocarbon carcinogenicity.

1281 STUDIES ON PULMONARY ARYL HYDROCARBON HYDROXYLASE ACTIVITY IN INBRED STRAINS OF MICE. (Eng.) Kouri, R. E. (Microbiological Associates, 4733 Bethesda Ave., Bethesda, MD 20014); Rude, T.; Thomas, P. E.; Whitmire, C. E. *Chem Biol Interact* 13(3/4): 317-331; 1976.

Pulmonary and hepatic levels of aryl hydrocarbon hydroxylase (AHH) were studied in inbred strains of mice following intratracheal instillation of 3-methylcholanthrene (MCA). Instillation of 188 μg MCA in sterile 0.2% gelatin in saline resulted in preferential induction of pulmonary AHH. The pulmonary AHH levels of strains C57BL/6Cum, C57BL/6J, BALB/cMai, C3H/fMai, and C57L/J were observed to be induced within 24 hr after treatment. Strains DBA/2Cum, AKR/J, SLJ/J, DBA/2J, and RF/J expressed no such increase. At a dose of 500g MCA, the pulmonary tissue of DBA/2 mice did express a four-fold increase. This increase in AHH was different from the increase observed in C57BL/6 mice by: (a) specific activity of the enzymes, (b) genetic regulation, (c) susceptibility to inhibition by 7,8-benzoflavone, and (d) spectral properties of the associated cytochromes. It was of major importance that induction of pulmonary AHH was observed to be regulated by a single dominant gene in crosses involving the C57BL/6Cum and DBA/2Cum strains of mice. These genetically regulated levels of AHH may play a role in susceptibility to cancers induced by polycyclic aromatic hydrocarbon carcinogens.

1282 HISTOLOGICAL CHANGES IN THE MOUSE SKIN AFTER ONE SUBCUTANEOUS INJECTION OF 20-METHYLCHOLANTHRENE. (Eng.) Bhisey, R. A. (Cancer Res. Inst., Tata Memorial Center, Parel, Bombay-400 012, India); Sirsat, S. M. *Indian J Cancer* 12(4): 430-438; 1975.

Morphological studies were undertaken to elucidate the preneoplastic alterations in Swiss albino mouse epidermis after one sc injection of 0.5 mg of 20-methylcholanthrene dissolved in thiophene-free benzene. Only a mild focal epidermal hyperplasia three to four cells thick was present in the precancerous mouse skin, and massive hyperplasia was not observed at any stage. It is concluded that epidermal hyperplasia is not a prerequisite for epidermal tumorigenesis in mice treated with 20-methylcholanthrene in this manner. This route of administration elicits skin reactions different from those reported in mouse skin topically painted with the carcinogen.

1283 DNA REPAIR SYNTHESIS IN GUINEA PIG PANCREATIC SLICES FOLLOWING IN VITRO EXPOSURE TO *N*-NITROSOMETHYLURETHANE. (Eng.) Hasumi, K. (Case Western Reserve Univ. Sch. Medicine, Cleveland, OH 44106; Iqbal, Z. M.; Epstein, S. S. *Chem Biol Interact* 13(3/4): 279-286: 1976.

The incorporation of thymidine into DNA in the presence of hydroxyurea (HU) by guinea pig pancreatic slices following exposure to N-nitrosomethylurethane (NMUT) was used to follow DNA repair synthesis. HU suppressed normal replicative DNA synthesis by 5- to 8-fold. Slices from the duodenal segment of the pancreas were exposed for 15-90 min to NMUT at concentrations of 2-20 mM and then incubated in tritiated thymidine free of carcinogen, and the radioactivity in DNA was determined. NMUT induced a dose- and time-dependent increase in HU-insensitive thymidine incorporation. This stimulated incorporation, which could be attributed to repair synthesis, occurred immediately following the treatment, and was largely complete within 3 hr.

1284 TRANSFER OF METHYL GROUPS FROM N-DIMETHYLNITROSAMINE TO GLYCEROLIPIDS IN RAT LIVER. (Eng.) Snyder, F. (Medical and Health Sciences Div., Oak Ridge Associated Univ., Oak Ridge, TN 37830); Malone, B. *Chem Biol Interact* 13(3/4): 237-241; 1976.

The in vivo labeling of lipids was measured after a single ip injection of 20 μCi (0.3 mg) of [^{14}C]-dimethylnitrosamine into three male Fischer CDF rats. Liver was most active in incorporating [^{14}C]-methyl groups into lipids (0.91% of the injected dose), and 80% of the activity appeared in sn-3-phosphatidylcholine. Chromatographic analysis of the products (and derivatives) formed after treatment of the [^{14}C]phosphatidylcholine with phospholipase A_2 and phospholipase C demonstrated that 89% of the radioactivity was in the choline moiety. These results indicate that the transfer of methyl groups to lipids occurred via the lipid methylation pathway that converts phosphatidylethanolamine to phosphatidylcholine.

285 CARCINOGENIC EFFECTS OF DIFFERENT NITROSO-COMPOUNDS IN CHINESE HAMSTERS. (Eng.) eznik, G. (Medizinische Hochschule Hannover, 3000 annover 61, Karl-Wiechert-Allee 9, W. Germany); ohr, U.; Kmoch, N. *Br J Cancer* 33(4): 411-418; 976.

tudies were conducted to determine whether or not he Chinese hamster *Cricetulu griseus* reacts to reatment with N-diethylnitrosamine (DEN) or diethylnitrosamine (DMN) in a manner similar to hat reported for other hamster species. Three undred and twenty Chinese hamsters were treated c with 1/5, 1/10, or 1/20 LD_{50} of DMN or DEN. hese substances, in several respects, showed a ifferent organotropy in this species than in both he Syrian golden and the European hamster. In the hinese hamster, DEN produced up to 100% squamous ell papillomata and occasionally also carcinomata f the cheek pouch, tongue, pharynx, esophagus, nd forestomach. With DEN a high rate of hepatomata as simultaneously observed. DMN induced a coniderable quantity of liver tumors, the highest ncidence being demonstrated in the lowest dosage roup.

286 TISSUE DISTRIBUTION AND MODE OF DNA METHYLATION IN MICE BY METHYL METHANESULPHNATE AND *N*-METHYL-*N'*-NITRO-*N*-NITROSOGUANIDINE: ACK OF THYMIC LYMPHOMA INDUCTION AND LOW EXTENT F METHYLATION OF TARGET TISSUE DNA AT O-6 OF UANINE. (Eng.) Frei, J. V. (Dept. Pathology, niv. Western Ontario, London, Canada); Lawley, P. . *Chem Biol Interact* 13(3/4): 215-222; 1976.

he tissue distribution and mode of DNA methyla-thylation by methyl methanesulfonate (MMS) and -methyl-N'-nitro-N-nitrosoguanidine (MMNG) were tudied to determine why these agents at doses of 0% LD_{50} do not yield thymic lymphoma in mice, while -methyl-N-nitrosourea (MNUA) does. The studies howed a positive correlation with ability to ethylate the O-6 atom of guanine in DNA of the target tissues (thymus and bone marrow) and tumorigenesis in C57BL mice. MMS gave a low yield of this product due to its relatively low Sn1 reactivity, but was able to methylate DNA extensively at other sites in the target tissues and other organs examined. MNNG, despite its ability to methylate O-6 of guanine in DNA in vitro to the same relative extent as MNUA, methylated DNA of thymus and bone marrow to a very small extent in vivo, but was able to methylate DNA in certain other tissues nearer the site of ip injection. These findings contrast with the general relatively extensive methylation of O-6 of guanine in DNA of the target tissues and other organs by MNUA.

1287 DIMINUTION OF TUMORIGENESIS INITIATED BY 4-NITROQUINOLINE-1-OXIDE BY POST-TREATMENT WITH CAFFEINE IN MICE. (Eng.) Nomura, T. (Osaka Univ. Medical Sch., Fukushima-ku, Osaka 553, Japan). *Nature* 260(5551): 547-549; 1976.

The effect of caffeine treatment in 4-nitroquinoline-1-oxide (4NQO) tumorigenesis in ICR/Jcl mice was investigated. 4NQO was administered in a single sc dose (12.5 μg/g each) at intervals of 6-12 hr. Females given caffeine during either the early (0-36 hr) or late (120-156 hr) post-4NQO treatment had 60%-70% fewer lung tumors than did those treated with caffeine 12-48 hr before 4NQO treatment. In males, caffeine administered during the 120-156 hr after 4NQO treatment also significantly suppressed tumor frequency.

1288 ENHANCEMENT OF PANCREATIC TUMORIGENESIS OF 4-HYDROXYAMINOQUINOLINE 1-OXIDE BY ETHIONINE IN RATS. (Eng.) Konishi, Y. (Nara Medical Univ., 840 Shijo-cho, Kashihara, Nara-ken 634, Japan); Denda, A.; Miyata, Y.; Kawabata, H. *Gann* 67(1): 91-95; 1976.

The effect of ethionine on pancreatic tumorigenesis of 4-hydroxyaminoquinoline 1-oxide (4-HAQO) was studied in 58 male Wistar rats. In groups of rats given either a single iv injection of 4-HAQO (7 mg/kg) alone or a 4-HAQO injection following maintenance on a protein-deficient diet containing 0.5% ethionine for 4 or 18 days, the incidence of hyperplastic nodules of the exocrine pancreas was 90%, 100%, and 50%, respectively. The incidence of adenoma in these three groups was 30%, 40%, and 92%, respectively. Well-differentiated adenocarcinoma developed in 1 of 12 animals receiving the ethionine diet for 18 days followed by 4-HAQO. No tumors or nodules were found in the pancreas of animals that received 0.005 N HCl, either alone or following 18 days on the ethionine diet. The results suggest that the pancreatic tumorigenesis of 4-HAQO is enhanced by ethionine.

1289 HISTOLOGY OF CHEMICALLY INDUCED MESOTHELIOMAS IN MRC-WISTAR RATS. (Eng.) Pelfrene, A. (Univ. Nebraska Medical Center, Omaha, NB 68105); Garcia, H. *Tumori* 61(6): 509-516; 1975.

The histology of mesotheliomas found in the peritoneal cavities of 2 of 40 male Wistar rats given ip injections of 1-nitroso-5,6-dihydrouracil (NO-DHU) was studied. The rats had received 400 mg/kg of NO-DHU on the first, fourth, and eighth days of the experiment. The neoplasms consisted of either irregularly shaped tubules, which were rounded or scalloped and of various sizes, or solid groups of cells; the latter were mostly polygonal, with no clear tubular formations. The nuclei were mostly round, and mitotic figures were rare. The tumor stroma was composed of scanty connective tissue, with a few small fibrocytes and blood vessels. Both tumors had a few pools or meshlike deposits of period acid-Schiff- and alcian blue-positive material, lying either in pseudoglandular formations or between cell lines.

1290 AN ASSAY FOR PHOSPHOTRIESTER FORMATION IN THE REACTION OF ALKYLATING AGENTS WITH DEOXYRIBOSENUCLEIC ACID IN VITRO AND IN VIVO. (Eng.) Shooter, K. V. (Chester Beatty Res. Inst., Pollards Wood Res. Station, Nightingales Lane, Chalfont St., Giles, Bucks. HP8 4SP, Great Britain); Merrifield, R. K. *Chem Biol Interact* 13(3/4): 223-236, 1976.

Preliminary studies in vitro with bacteriophage T7-DNA showed that breaks formed in the DNA on the alkaline hydrolysis of apurinic sites and phosphotriesters can be distinguished from each other by measuring the extent of DNA degradation immediately after adding 0.1 M NaOH and after incubation for 1 hr in 0.5 M NaOH. This method was applied to the study of the formation and stability of phosphotriesters in vivo. Methyl phosphotriesters formed in liver DNA following injection of mice with N-methyl-N-nitrosourea disappeared with time (50%) in 4-5 days. The concentration of ethyl phosphotriesters in liver DNA formed by injecting mice with N-ethyl-N-nitrosourea did not appear to decrease with time. Results of experiments on injecting methyl methanesulfonate, ethyl methanesulfonate, and dimethyl sulfate are also reported. The method described does not require the use of radioactively labeled reagents.

1291 INDUCTION OF TUMORS IN FEMALE DONRYU RATS BY A SINGLE ADMINISTRATION OF 1-PROPYL-1-NITROSOUREA. (Eng.) Ogiu, T. (Natl. Inst. Hygienic Sciences, Kamiyoga 1-18-1, Setagaya-ku, Tokyo 158, Japan); Nakadate, M.; Odashima, S. *Gann* 67(1): 121-124; 1976.

The organ sites and incidence of tumors induced by single po or sc administration of 1-propyl-1-nitrosourea (PNU) were studied in groups of female Donryu rats. Groups 1a, 1b, and 1c were given a single gastric intubation of 800, 400, or 200 mg/kg PNU, respectively, and another group was given an sc injection of PNU (400 mg/kg). The incidence of tumors in the rats given PNU po was 11/23, 18/39, and 23/56 for Groups 1a, 1b, and 1c, respectively. The incidence of tumors was highest for mammary tumors (developing in 6, 8, and 12 animals from Groups 1a, 1b, and 1c, respectively) and for leukemia (4, 10, and 10 animals, respectively). The next highest incidence was for tumors of the ovary, thyroid, adrenal glands, and digestive tract. Eight of 25 rats given the sc injection developed tumors, with mammary tumors (20%) and subcutaneous tumors (12%) being the most prevalent. Leukemia and thymoma occurred in one rat each.

1292 THE ROLES OF AGE AT TREATMENT AND DOSE IN CARCINOGENESIS IN C3HF/DP MICE WITH A SINGLE ADMINISTRATION OF N-NITROSO-N-METHYLUREA. (Eng.) Terracini, B. (Istituto Nazionale per lo Studio e la Cura dei Tumori, Via G. Venezian 1, 20133 Milan, Italy); Testa, M. C.; Cabral, J. R.; Rossi, L. *Br J Cancer* 33(4): 427-439; 1976.

C3Hf/Dp mice were given a single ip injection of 50, 25, or 5 μg/g N-nitroso-N-methylurea (NMU) at either 1 or 70 days of age or 50 μg/g at 21 days of age. They were observed until death or until 120 wk of age. The two highest doses of NMU produced tumors in a wide spectrum of organs, including the thymus, forestomach, lung, liver (only in males), kidneys, ovaries, and orbital glands. The only two tumor types that appeared to be closely related to death were thymic lymphomas (most of which were found in mice dying before 40 wk after treatment) and carcinomas of the forestomach. The authors present lifetime analyses of the occurrence of these two tumor types as well as the occurrence of any tumor after 40 wk of age or since treatment. Incidences of thymic lymphomas were 67.6%, 39.0%, and 21.2% in mice receiving 50 μg/g NMU at 1, 21, and 70 days, respectively, and 17.1% in mice receiving 25 μg/g at 1 day. In the other groups the incidence of thymic lymphomas until death was related to both earliness of treatment and dose. On the contrary, incidences and progression of carcinomas of the forestomach were unrelated to age at treatment. Since breakdown of NMU is very rapid and does not require enzymes, these results are considered as evidence that host-tumor interaction differs from organ to organ. No excess of tumors over the controls was found in mice receiving 5 μg/g either at 1 or 70 days of age.

1293 THE PRESENCE OF TERMINAL DEOXYNUCLEOTIDYL TRANSFERASE IN THE N-METHYL-N-NITROSOUREA INDUCED LEUKEMIA IN BDF$_1$ MICE AND ITS EFFECT ON THE ACCURACY OF THE DNA POLYMERASES. (Eng.) Saffhill, R. (Christie Hosp. and Holt Radium Inst., Manchester M20 9BX, U.K.); Chaudhuri, L. *Nucleic Acids Res* 3(1): 277-284; 1976.

The accuracy of DNA polymerase isolated from normal BDF$_1$ mouse spleen in copying a polyd(AT)·polyd(AT) template was compared with that of DNA polymerase isolated from the spleens of BDF$_1$ mice bearing N-methyl-N-nitrosourea-induced leukemia, and the presence of the enzyme terminal deoxynucleotidyl transferase was determined. Cytoplasmic DNA polymerases (but not those from the nucleus) from leukemic mice were less accurate than the corresponding enzymes isolated from normal mouse spleens, as indicated by an increased level of wrong base incorporation in 4/5 leukemic cytoplasmic DNA polymerases. These preparations also contained the enzyme terminal deoxynucleotidyl transferase, and when it was removed from the preparation by Sephadex G-200 column chromatography, the accuracy of the leukemic cytoplasmic DNA polymerase was similar to that of the controls and of nuclear DNA polymerase. The inaccuracy is concluded to be the result of the presence of deoxynucleotidyl transferase and is not a property of the leukemic DNA polymerases.

1294 INDUCTION OF LYMPHATIC LEUKEMIA IN NON-INBRED MICE AND ITS CONTROL WITH GLUCOCORTICOSTEROIDS: THE LUCY WORTHAM JAMES LECTURE.

(Eng.) Huggins, C. B. (950 E. 59th St., Box 106, Chicago, IL 60637); Uematsu, K. *Cancer* 37(1): 317-326; 1976.

A lipid solution of 7,12-dimethylbenz(a)anthracene was given biweekly by gastric intubation to young adult female mice of the noninbred CF-1 strain. Lymphatic leukemia was elicited in 73% of the animals in 112 days. Brief ether anesthesia facilitated alimentary administration of hydrocarbons and steroids. Inoculation of whole blood of mice with lymphatic leukemia into the subcutaneous tissue of allogeneic newborns resulted in lymphosarcomas at the injection site sometimes associated with leukemia. The lymphosarcomas of infant mice regressed rapidly following administration of cortisone or dexamethasone. They frequently, but not invariably, recurred; 14% of the mice were free from lymphosarcoma 3 mo after treatment with the glucocorticoids.

1295 SECRETION OF HUMAN PROLACTIN IN VITRO.

(Eng.) Knazek, R. A. (Natl. Cancer Inst., Natl. Insts. Health, Bethesda, MD 20014); Skyler, J. S. *Proc Soc Exp Biol Med* 151(3): 561-564; 1976.

Pituitary tumor cells from two men were grown in capillary culture units, and prolactin production was measured by specific double antibody radioimmunoassay. Approximately 300 mg of tumor fragments from a 51-yr-old man were grown in Ham's medium. During the first 4 mo, 3 mg of prolactin were produced; the secretion rate decreased steadily during the culture period. In a second culture unit containing 50 μg of tumor tissue from a 50-yr-old man, the daily secretory rate declined from an initial value of 15 μg to 5 μg by day 18. On day 4, the nutrient medium had been replaced for 1 hr with a solution of complete medium plus 100 mg thyrotropic releasing hormone (TRH) and 25 μCi ^{14}C-protein hydrolysate. An 8-min lag occurred between the exposure of the pituitary tissue to TRH and the increased secretion of prolactin. The massive burst of secretion was followed by a rapid decline in secretory rate and a second peak of secretion. The secretory rate gradually decreased over the next 3 hr to near baseline levels. It is concluded that the capillary culture technique provides cells with an artificially vascularized environment that closely simulates the in vivo state, allowing transient cellular responses to both physiologic and pharmacologic agents to be followed. In addition, the technique could reduce the shortage of human hormones.

1296 METABOLIC CONTROLS IN PRECANCEROUS LIVER-VII. TIME COURSE OF LOSS OF DIETARY FEEDBACK CONTROL OF CHOLESTEROL SYNTHESIS DURING CARCINOGEN TREATMENT.

(Eng.) Sabine, J. R. (Dept. Animal Physiology, Waite Agricultural Res. Inst., Univ. Adelaide, S.A., Australia). *Eur J Cancer* 12(4): 299-303; 1976.

A previously described technique was modified to determine the dietary feedback status of hepatic cholesterol synthesis at frequent intervals during the feeding of ethionine, carbon tetrachloride, and methylazoxymethanol acetate (MAM-acetate) to Hooded-Wistar rats. The method involved the feeding of trans-1,4-bis(2-chlorobenzylaminomethyl)-cyclohexane dihydrochloride (AY9944; 50 mg/kg feed), which causes an accumulation of 7-dehydrocholesterol in any cholesterogenic tissue. Samples of blood were collected daily, saponified, and extracted with n-hexane; the hexane was then evaporated and the 7-dehydrocholesterol was measured as ''fast-acting'' sterols. Ethionine (0.25% in feed) and MAM-acetate (50 mg/kg body wt., ip) caused a rapid and sudden loss of feedback inhibition of hepatic cholesterol synthesis at approximately 7-9 and 11-14 days, respectively. Loss of control was not caused by carbon tetrachloride.

1297 BREAST AND THYROID CANCER AND MALIGNANT MELANOMA PROMOTED BY ALCOHOL-INDUCED PITUITARY SECRETION OF PROLACTIN, T.S.H., AND M.S.H.

(Eng.) Williams, R. R. (Natl. Insts. Health, N.H.L.I., Landow C0825, Bethesda, MD 20014). *Lancet* 1(7967): 996-999; 1976.

Data indicating an association between alcohol ingestion with a higher incidence of breast and thyroid cancers and malignant melanoma are explained by a unifying hypothesis. It is proposed that alcohol stimulates anterior pituitary secretion of prolactin, thyroid-stimulating hormone (TSH), and melanocyte-stimulating hormone (MSH). Under the stimulation of these hormones, the three target tissues exhibit increased mitotic activity and hence an increased susceptibility to the development of a malignancy. A wide variety of findings from other studies support this hypothesis. In addition to alcohol, several common drugs acting in similar manner could be cancer promoters, including reserpine, methyldopa, phenothiazones, *d*-amphetamine, tricyclic antidepressants, and antihistamines. Over 20,000 (25%) of all new breast cancer cases each year in the U.S.A. could be preventable if this hypothesis is correct.

1298 ESTROGENS, THE PILL, AND THE BREAST.

(Eng.) Gray, L. A.; Robertson, R. W., Jr. In: *Early Breast Cancer: Detection and Treat-*

ment. Edited by H. S. Gallagher. (New York: Wiley): pp. 27-36; 1975.

The effect of steroids on breast lesions was investigated by re-examining the microscopic findings from 850 consecutive breast biopsies done between November 1969 and July 1973. All biopsies represented areas of thickening or nodularity of concern to the patients. Carcinoma was found in 178 (20.9%). Of the 850 patients, 320 received no hormone therapy and 365 had no information as to whether they received therapy or not. The remaining 165 women (19.4%) received hormone therapy over extended periods of time; 94 (11%) took estrogens and 71 (8.4%) took oral contraceptive hormonal preparations. Microscopic findings in the biopsies of the 94 patients receiving estrogen (average age 56 yr) included carcinomas in 25. Among the 71 patients on the pill (average age 31 yr), 8 had carcinomas, the largest number yet reported. Among the 320 patients known never to have received any hormonal preparations (37.6% of the total, average age 45 yr), carcinoma was present in 61. The incidence of hyperplasia was similar in patients not receiving hormones (30.3%) and in those taking birth control pills (33.9%). Of those receiving estrogens, 42.9% had duct hyperplasias. Carcinomas were found in 19% of those receiving no hormones, 26.6% of those receiving estrogens, and 11.2% of those taking birth control pills. Of those with cancer and hyperplastic lesions, 36% had received no hormone, 28% had received estrogens, and 37.5% had taken birth control pills. This study indicates that neither estrogens nor contraceptive hormonal preparations can at this time be considered major causes of breast cancer.

1299 BIOCHEMICAL CHANGES DURING REGRESSION AND REGROWTH OF HORMONE-DEPENDENT GR MOUSE MAMMARY TUMORS. (Eng.) Schulein, M. (Fibiger Lab., Ndr. Frihavnsgade 70, 2100 Copenhagen, Denmark); Daehnfeldt, J. L.; Briand, P. *Int J Cancer* 17(1): 120-128; 1976.

Hormone-dependent transplanted mammary GR tumors, maintained in castrated syngeneic GR/Fib male mice by estrone-progesterone treatment (0.5 µg estrone/ml drinking water; progesterone: 5-10 mg/wk, pellets sc), regressed upon cessation of this treatment; the synthesis and content of RNA, DNA, and protein were studied. The RNA/g wet wt of tumor decreased ($p < 0.01$) after 2 days of regression; it was 65% of the initial amount after 3 days. The DNA and protein content remained constant. Incorporation of ^{32}P-orthophosphate into DNA decreased 75%, and into RNA, 50%, during 2 days of regression. In vivo incorporation of ^{35}S-methionine in regressing tumors was 60% of the incorporation found 3 days after readministration of hormones ($p < 0.01$). It appears that regression of tumors was caused by a decrease in the rate of cell replication rather than by an increase in the rate of cell loss. Recommencement of hormone treatment resulted in regrowth of the tumors, accompanied by a rapid increase in the rate of ^{32}P into RNA, while the increased incorporation of ^{32}P into DNA showed a lag of 1 to 2 days. SDS-polyacrylamide gel electrophoresis of soluble proteins labeled in vivo with ^{14}C- and ^{3}H-leucine during regression and regrowth, respectively, did not demonstrate any differences in the relative labeling pattern of the proteins. This tumor model is suitable for the study of the hormonal responses of hormone-dependent mammary tumors.

1300 SEX STEROID INDUCED MORPHOLOGICAL CHANGES IN PRIMARY UTERINE CELL CULTURES. (Eng.) Berliner, J. A. (Univ. California Los Angeles Sch. Medicine, 900 Veteran Ave., Los Angeles, CA 90272); Gerschenson, L. E. *J Steroid Biochem* 7(3): 153-158; 1976.

The ultrastructure of primary cultures of endometrial cells after treatment with 10^{-7} M diethylstilbestrol, 10^{-7} M progesterone and 10^{-7} M hydrocortisone was examined using electron microscopic stereology. Cells treated with diethylstilbestrol had the appearance of a rapidly dividing culture culture having large euchromatic nuclei and prominent nucleoli with a cytoplasm containing many free ribosomes. Progesterone appeared to convert the cells to a more secretory type with large amounts of rough endoplasmic reticulum and smaller nucleoli. Mitochondrial enlargement was induced by sex hormones but not by hydrocortisone.

1301 BIOGENESIS OF STEROID HORMONES BY HUMAN MAMMARY GLAND IN VIVO AND IN VITRO. (Eng.) Deshpande, N. (Imperial Cancer Res. Fund Labs., Lincoln's Inn Fields, London WC2A 3PX, England); Carson, P.; Di Martino, L.; Tarquini, A. *Eur J Cancer* 12(4): 271-276; 1976.

The ability of human breast tumors to synthesize active steroid hormones from inactive precursors both in vivo and in vitro has been assessed. The breasts of women with early breast cancer awaiting mastectomy were perfused in situ with various radiolabeled steroid precursors, and blood and tumor samples were removed for extraction of products. For in vitro studies benign and malignant tumors were removed and incubated with the precursors, and the products were extracted. The results indicate that several key enzymes involved in hormone synthesis are not present in breast tumors. Also, the tumors could not synthesize the steroid precursors. However, they did convert pregnenolone and dehydroepiandrosterone to progesterone and androstenedione, indicating that the tumors are somewhat independent of the host for control of their hormonal environment. Progesterone and androgens have a stimulatory effect on organ cultures of human breast tissues; therefore, the role of these steroids in maintenance and growth is an important area of study. The fact that benign tumors can synthesize the hormones suggests that this ability is not a result of induction of malignancy and that there are no transcriptional changes in the synthesizing enzymes as a result of transformation.

1302 HORMONAL IMPLICATIONS OF CHEMICALLY INDUCED ENDOCRINE TUMOURS IN SERIAL TRANSPLANTATION. (Eng.) Randeria, J. D. (Dept. Physiology, Medical Sch., Univ. Natal, Natal, India). *Indian J Cancer* 12(3): 279-285; 1976.

An investigation was made of the steroid-hormone secreting capabilities of two serially transplanted endocrine tumors. Serial subcutaneous transplantations of pseudofollicular granulosa cell tumors originally derived from an ovarian tumor induced in a C_3H(Jax) strain female mouse by 7,12-dimethylbenz(a)anthracene (DMBA), were performed in syngeneic male mice. The transplantations were successful in 32/34 cases and the tumors grew up to a size of 3 cm after a latent period of 4-12 wk. The atrophy of male genitalia, and other criteria, demonstrated that the tumors had continually secreted estrogen in 8/32 cases. Similar transplantations were performed of an undifferentiated ''A'' cell type tumor that arose from the adrenal gland of the same DMBA-treated female mouse. The transplantation was successful in 32/35 male hosts. The latent period of growth varied from 10-40 wk. All the tumors were encapsulated, vascular, non-necrotic, non-metastasizing and undifferentiated. There was evidence of ''corticoid'' granules in the individual cells. However, no evidence of active steroid secretion was provided by an examination of the hosts' adrenals and other organs.

1303 ANDROGEN RECEPTORS AND ANDROGEN-DEPENDENT INITIATION OF PROTEIN SYNTHESIS IN THE PROSTATE. (Eng.) Liao, S. (Ben May Lab. Cancer Res., Univ. Chicago, Chicago, IL); Tymoczko, J. L.; Castaneda, E.; Liang, T. *Vitam Horm* 33: 297-317; 1975.

Recent studies relating to elucidation of the receptor mechanism involved in the action of 5α-dihydrotestosterone (DHT) are reviewed. Binding proteins have been demonstrated in both cytosol and microsomal fractions of the prostate. DHT-receptor complexes sediment at 7-12 S and 3-5 S units, the larger units being converted to the smaller by incubation at 20-30 C. Studies of structural requirements for binding indicate that the bulkiness and flatness of the steroid molecule play a more important role in receptor-binding than the detailed electronic structure or atoms of the steroid nucleus. A simple quantitative and qualitative assay of the steroid-receptor complex makes use of the interaction with antisteroid antibodies. Various metal ions have differing effects on the sedimentation properties of the complex. Both ATP and GTP can interact with and stabilize the DHT-receptor complex, and binding to some but not all polynucleotides has been demonstrated. DHT-receptor complex forms a 60-80 S complex with ribonucleoprotein from prostate, but not from liver. Purified prostate cell nuclei can selectively retain the DHT-receptor complex. The DHT-dependent translocation of the cytoplasmic receptor protein to the prostate cell nuclei is temperature-dependent. Heating or proteolytic treatment of nuclei can result in the loss of specific binding of the DHR-receptor complex. Prostate ribosomes from androgen-treated rats have higher protein synthesizing ability than those from control castrates, an effect attributed to the androgen-dependent increase in mRNA content. Experimental evidence that steroid hormones and their receptors act primarily at the level of gene transcription is cited. The role of the steroid-receptor complex may involve action at the level of processing and utilization of RNA in addition to the primary function of regulating RNA synthesis.

1304 INHIBITION OF ORNITHINE DECARBOXYLASE ACTIVITY AND SPERMIDINE ACCUMULATION IN REGENERATING RAT LIVER. (Eng.) Poso, H. (Dept. Biochemistry, Univ. Helsinki, SF-00170 Helsinki 17, Finland); Janne, J. *Biochem Biophys Res Commun* 69(4): 885-892; 1976.

Injections of 1,3-diaminopropane (75 µM/100 g, ip) into partially hepatectomized rats powerfully inhibited ornithine decarboxylase activity in the regenerating liver in vivo. The compound had no effect on the enzyme activity in vitro but appeared to exert an inhibitory influence on the synthesis of ornithine decarboxylase itself. Repeated injections of diaminopropane into rats after partial hepatectomy, begun at the time of the operation and continued until 33 hr postoperatively, markedly diminished the stimulation of ornithine decarboxylase activity in the regenerating liver remnant and prevented the increases in hepatic spermidine concentration normally occurring in response to partial hepatectomy. Treatment of the rats with diaminopropane did not depress the activity of adenosylmethionine decarboxylase in the regenerating liver. Nor did the compound have any effect on the activity of spermidine synthase in vitro, thus proving that the increased accumulation of liver spermidine after partial hepatectomy primarily depends upon a stimulation of ornithine decarboxylase activity and a concomitant accumulation of putrescine. 1,3-Diaminopropane could not replace putrescine in the synthesis of higher polyamines in rat liver. The inhibition of ornithine decarboxylase by diaminopropane thus appears to represent ''gratuitous'' repression of polyamine biosynthesis and might conceivably be used for studies devoted to the elucidation of the physiological functions of natural polyamines.

1305 EFFECT OF PHORBOL MYRISTATE ACETATE ON THE OXIDATIVE METABOLISM OF HUMAN POLYMORPHONUCLEAR LEUKOCYTES. (Eng.) DeChatelet, L. R. (Bowman Gray Sch. Medicine, Winston-Salem, NC 27103); Shirley, P. S.; Johnston, R. B., Jr. *Blood* 47(4): 545-554; 1976.

Evidence that the effect of phorbol myristate acetate (PMA) on polymorphonuclear leukocytes is closely analogous to that of the phagocytic process is presented. The addition of 0.1 µg/ml of PMA to a suspension of resting human neutrophils caused a marked stimulation of all aspects of cellular oxidative metabolism normally associated with phagocytosis. PMA induced a greatly increased rate of glucose oxidation via the hexose monophosphate shunt, increased production of superoxide anion and of hydrogen peroxide, increased cellular chemiluminescence, and increased iodination of protein material. The time courses of hexose monophosphate shunt activation and chemiluminescence were similar to those observed following phagocytosis of opsonized zymosan; the levels of activation achieved in all cases approximated those seen following phagocytosis. These phenomena are not simply reflections of altered cellular permeability, because PMA actually inhibited the uptake of radioactive 2-deoxyglucose and of uniformly labeled amino acids. The addition of PMA similarly inhibited the uptake of ^{14}C-labeled bacteria, suggesting a competition between the effect of the chemical and the process of phagocytosis. These results suggest that PMA activates the cell in the same manner as does phagocytosis. This compound should provide a useful tool for elucidating the metabolic events underlying phagocytosis and bacterial killing by polymorphonuclear leukocytes.

1306 INHIBITION OF NITROSAMINE FORMATION IN FRIED BACON BY PROPYL GALLATE AND L-ASCORBYL PALMITATE. (Eng.) Sen, N. P. (Food Res. Div., Health Protection Branch, Ottawa, Ontario, Canada K1A OL2); Donaldson, B.; Seaman, S.; Iyengar, J. R.; Miles, W. F. *J Agric Food Chem* 24(2): 397-401; 1976.

The spray treatment of nitrite-cured bacon with 1,000 ppm of propyl gallate, piperazine, or ascorbyl palmitate reduced the formation of nitrosopyrrolidine by 60-90% during cooking 30-60 min afterwards. Sodium ascorbate proved to be less effective. The additives did not appear to inhibit nitrosopyrrolidine formation that can occur via the decarboxylation of nitrosoproline, since they did not reduce the formation of nitrosopyrrolidine from nitrosoproline added to non-nitrite-cured bacon immediately before cooking. The addition of ascorbyl palmitate to bacon, before or after curing, may be an acceptable way of minimizing the formation of carcinogenic nitrite-derivatives during cooking. Piperazine was used because of its rapid reaction with nitrite; it is not suggested for use with bacon.

1307 CARCINOGENIC ACTIVITY OF COLTSFOOT, *TUSSILAGO FARFARA* L. (Eng.) Hirono, I. (Gifu Univ. Sch. Medicine, 40 Tsukasa-machi, Gifu 500, Japan); Mori, H.; Culvenor, C. C. J. *Gann* 67(1): 125-129; 1976.

The carcinogenicity of young, preblooming flowers of coltsfoot, *Tussilago farfara* L., was studied in inbred strain ACI rats. Rats were divided into four groups: Group I received 32% coltsfoot diet for 4 days, and subsequently 16% diet until the termination of experiment. Groups II and III respectively received 8% and 4% coltsfoot diet for 600 days. Group IV was fed a normal diet as a control group. The experiments were terminated 600 days after the start of administration of coltsfoot diet. All the rats in group I survived beyond 380 days after the start of feeding and 8 out of 12 rats developed hemangioendothelial sarcoma in the liver, whereas only 1 out of 10 rats developed the tumor in group II, and no tumors were observed in group III. It is apparent that this widely used herbal remedy is carcinogenic.

1308 GAS CHROMATOGRAPHIC DETERMINATION OF NEOPHYTADIENE AS A MEASURE OF THE TERPENOID CONTRIBUTION TO EXPERIMENTAL TOBACCO SMOKE CARCINOGENESIS. (Eng.) Guerin, M. R. (Tobacco Smoke Research Program, Analytical Chemistry Div., Oak Ridge Natl. Lab., Oak Ridge, TN 37830); Olerich, G. *Environ Lett* 10(3): 265-273; 1975.

The presence of the 20-carbon terpene, neophytadiene, in the total particulate matter from tobacco smoke is proposed as an indicator of terpene levels. The most carcinogenic tobacco smoke fractions are enriched in terpenes, which are suspected carcinogens. Chloroform extracts of the filters of smoked cigarettes (Kentucky Reference Cigarette, Standard Experimental Blend, flue-cured tobacco, and reconstituted tobacco sheet) were analyzed by gas liquid chromatography/mass spectrometry. The results agreed with data for authentic neophytadiene. Recoveries of neophytadiene from tobacco smoke are almost complete. Results ranged from 0 to 333 μg neophytadiene per cigarette (0.083 wt % total particulate matter) and from 0 to 333 μg neophytadiene per cigarette (0 to 1.05 wt % total particulate matter) for two groups of cigarettes. Correlation coefficients of +0.86 and +0.88, respectively, of neophytadiene with the presence of isoprene were obtained.

1309 EFFECT OF TOBACCO AND LIME ON ORAL MUCOSA OF RATS FED ON VITAMIN B DEFICIENT DIET. (Eng.) Gothoskar, S. V. (No affiliation given). Sant, S. M.; Ranadive, K. J. *Indian J Cancer* 12(4): 424-429; 1975.

Experiments were performed to elucidate the role of vitamin B deficiency in oral carcinogenesis. Out of the group of 29 Wistar rats maintained on a vitamin B-deficient diet, all rats — six treated with tobacco and seven others treated with tobacco and lime — presented atypical changes including massive keratinisation, patchy thinning out of mucosal epithelium, and loss of basement membrane after 18 mo of biweekly painting. Although it was not possible to induce frank oral carcinogenesis in these rats with tobacco extract, the early atypia in rats maintained on the vitamin B-deficient diet is significant when the previously reported high resistance of the oral mucosa to tobacco extracts is taken into account.

1310 POLYCYCLIC AROMATIC COMPOUNDS IN NATURE. (Eng.) Blumer, M. (No affiliation given).

Sci Am 234(3): 35-45; 1976.

A great variety of polycyclic aromatic hydrocarbons (PAHs), including both known and suspected carcinogens, are widespread throughout soils, sea-bottom sediments and petroleum deposits. They are formed whenever organic substances are exposed to high temperatures. The great uniformity of composition and the nature of alkyl substituents suggest that most of the PAHs in the soil and in the sea-bed have been derived over eons from the fall-out of soot from forest and prairie fires. Conversely, the aromatic hydrocarbons of crude oil have been formed over millions of years from organic matter in sediments at 100-150 C. This has resulted in a much richer composition of alkylated PAH species than in soil or sea-bed. Oil spills therefore result in a changed local spectrum of PAHs, which may be detected for at least 6 yr after such an event. There is controversy about whether living organisms are able to synthesize PAHs. The ubiquity of PAHs in nature makes a direct experimental approach to this problem very difficult, but there is evidence that certain less volatile categories of PAHs are not present in plants grown in an environment free of such PAH species. This suggests that living organisms do not make PAHs. Natural fires and reactions in sediments produced PAHs long before the advent of man. They may be ranked with other natural mutagens such as UV radiation and natural radioactivity.

1311 METAL-POLYNUCLEOTIDE INTERACTIONS. A COMPARISON OF CARCINOGENIC AND NON-CARCINOGENIC METALS IN VITRO. (Eng.) Murray, M. J. (Dept. Biology, Univ. San Francisco, San Francisco, CA 94117); Flessel, C. P. *Biochim Biophys Acta* 425(2): 256-261; 1976.

An investigation has been made of the effects of Mn^{2+}, Cd^{2+}, Mg^{2+} and Zn^{2+} ions (all chlorides, at 10^{-3} M) on the interaction of the homopolymer polyinosinic acid, poly(I), with the partially complementary heteropolymers poly(C,U) and poly(C,A) as monitored by the optical absorptions of solutions containing different relative amounts of the polymers. Mn^{2+} and Cd^{2+}, which are believed to be carcinogens in animals, induced mispairing in complexes formed between poly(I) and poly(C,U), whereas the other divalent metal ions did not. Mn^{2+} also induced mispairing between poly(I) and poly(C,A). The results suggest that metal carcinogenesis in the case of Cd^{2+} and Mn^{2+} may involve the direct interaction of metal ions with nucleic acids.

1312 AFLATOXIN B_1 CARCINOGENESIS: HEPATOPROTECTION BY ADRENOCORTICOTROPHIN AND INDUCTION OF MALIGNANT LYMPHOMA (Abstract). (Eng.) Chedid, A. (Univ. of Cincinnati Coll. Medicine, Cincinnati, OH 45267); Bundeally, A. *Lab Invest* 34(3): 310; 1976.

1313 SOME STUDIES OF THE EFFECTS OF AFLATOXIN B_1 IN VIVO AND IN VITRO ON NUCLEIC ACID SYNTHESIS IN RAT AND MOUSE. (Eng.) Godoy, H. M. (C.I.T.E.F.A., Laboratorio Quimica Biotoxicologica, Zufriategui y Varela, Villa Martelli, Prov. de Buenos Aires, Argentina): Neal, G. E. *Chem Biol Interact* 13(3/4): 257-277; 1976.

1314 HIGH-PRESSURE LIQUID CHROMATOGRAPHY OF OXIDATIVE AFLATOXIN METABOLITES. (Eng.) Hsieh, D. P. H. (Dept. Environmental Toxicology, Univ. California, Davis, CA 95616); Fitzell, D. L.; Miller, J. L.; Seiber, J. N. *J Chromatogr* 117(2): 474-479; 1976.

1315 HIGH-PERFORMANCE LIQUID CHROMATOGRAPHY OF STERIGMATOCYSTIN AND OTHER METABOLITES OF *ASPERGILLUS VERSICOLOR*. (Eng.) Kingston, D. G. I. (Dept. Chemistry, Virginia Polytechnic Inst., Blacksburg, VA 24061); Chen, P. N.; Vercellotti, J. R. *J Chromatogr* 118(3): 414-417; 1976.

1316 STUDY OF THE METABOLISM OF HOMOOCTOPINE AND OF ONE OF ITS ANALOGS BY *AGROBACTERIUM TUMEFACIENS*. (Fre.) Petit, A. (CNRA, route de Saint-Cyr, 78000 Versailles, France); Tempe, J. *C R Acad Sci (D) (Paris)* 282(1): 69-71; 1976.

1317 AFLATOXIN IN PEACANS: PROBLEMS AND SOLUTIONS (Abstract). (Eng.) Ayres, J. L. (Gold Kist Res. Center, 2230 Industrial Blvd., Lithonia, GA 30058). *J Am Oil Chem Soc* 53(2): 144A; 1976.

1318 TYPE AND LEVEL OF DIETARY FAT, VITAMIN E DEFICIENCY AND CHRONIC AFLATOXIN TOXICITY (Abstract). (Eng.) Alfin-Slater, R. B. (UCLA Sch. of Public Health, 405 Hilgard, Los Angeles, CA 90024); Aftergood, L.; Alexander, A.; Wells, P. *J Am Oil Chem Soc* 53(2): 147A; 1976.

1319 A RAPID SCREENING METHOD FOR THE AFLATOXINS AND OCHRATOXIN A (Abstract). (Eng.) Holaday, C. E. (Natl. Peanut Res. Lab., P.O. Box 637, Dawson, GA 31742). *J Am Oil Chem Soc* 53(2): 147A; 1976.

1320 SOLVENT EXTRACTION OF AFLATOXINS FROM CONTAMINATED AGRICULTURAL PRODUCTS (Abstract). (Eng.) Rayner, E. T. (Southern Regional Res. Center, ARS, USDA, P.O. Box 19687, New Orleans, LA 70179); Koltun, S. P. *J Am Oil Chem Soc* 53(2): 147A; 1976.

1321 AFLATOXIN IN CORN (Abstract). (Eng.) Shotwell, O. L. (Northern Regional Res. Lab., ARS, USD, 1815 N. University, Peoria, IL 61604). *J Am Oil Chem Soc* 53(2): 144A; 1976.

1322 PROCESSING CONDITIONS FOR INACTIVATING AFLATOXINS IN COTTONSEED MEAL BY AMMONIATION (Abstract). (Eng.) Koltun, S. P. (Southern Regional Res. Center, ARS, USDA, P.O. Box 19687, New Orleans, LA 70179); Rayner, E. T.; Wadsworth, J. I. *J Am Oil Chem Soc* 53(2): 147A; 1976.

1323 PROCESSING EDIBLE PEANUT PROTEIN CONCENTRATES AND ISOLATES TO INACTIVATE AFLATOXINS (Abstract). (Eng.) Rhee, K.-C. (Food Protein R&D Center, Texas A&M Univ., College Station, TX 77843); Natarajan, K. R.; Cater, C. M.; Mattil, K. F. *J Am Oil Chem Soc* 53(2): 147A; 1976.

1324 AFLATOXIN CONTROL PROGRAM FOR PEANUTS (Abstract). (Eng.) Dickens, J. W. (ARS, USDA, P.O. Box 5906, Raleigh, NC 27607). *J Am Chem Soc* 53(2): 144A; 1976.

1325 CHEMISTRY OF AFLATOXIN INACTIVATION (Abstract). (Eng.) Dollear, F. G. (Southern Regional Res. Center, ARS, USDA, P.O. Box 19687, New Orleans, LA 70179); Rayner, E. T.; Codifer, L. P., Jr. *J Am Oil Chem Soc* 53(2): 146A; 1976.

1326 SEPARATION OF AFLATOXIN-CONTAMINATED COTTONSEED BY PHYSICAL CHARACTERISTICS OF THE GINNED SEED (Abstract). (Eng.) Lee, L. S. (Southern Regional Res. Center, ARS, USDA, P.O. Box 19687, New Orleans, LA 70170); Cucullu, A. F.; Pons, W. A., Jr. *J Am Oil Chem Soc* 53(2): 146A-147A; 1976.

1327 FIELD CONTAMINATION OF COTTONSEED BY *ASPERGILLUS FLAVUS*: OCCURRENCE AND CONTROL (Abstract). (Eng.) Russell, T. E. (Mesa Experiment Station, Univ. of Arizona, P.O. Box 1308, Mesa, AZ 85201); Ryan, G. F. *J Am Oil Chem Soc* 53(2): 144A; 1976.

1328 SURVEY OF AFLATOXIN IN CALIFORNIA TREE NUTS (Abstract). (Eng.) Fuller, G. (Western Regional Res. Center, ARS, USDA, Berkeley, CA 94710); Spooncer, W. W.; King, A. D., Jr.; Schade, J.; Mackey, B. E. *J Am Oil Chem Soc* 53(2): 144A; 1976.

1329 THE EFFECT OF DIELDRIN-CONTAMINATED FEED ON RAT HEPATIC MICROSOMAL EPOXIDE HYDRASE AND ARYL HYDROCARBON HYDROXYLASE. (Eng.) Bellward, G. D. (Faculty Pharmaceutical Sciences, Univ. British Columbia, Vancouver, B.C. V6T 1W5 Canada); Dawson, R.; Otten, M. *Res Commun Chem Pathol Pharmacol* 12(4): 669-684; 1975.

1330 A LOW-MOLECULAR-WEIGHT PROTEIN FROM RAT LIVER THAT RESEMBLES LIGANDIN IN ITS BINDING PROPERTIES. (Eng.) Ketterer, B. (Middlesex Hosp. Medical Sch., London W1P 5PR, United Kingdom); Tipping, E.; Hackney, J. F.; Beale, D. *Biochem J* 155(3): 511-521; 1976.

1331 ESTROGENS AND ENDOMETRIAL CARCINOMA (Letter to Editor). (Eng.) Goldman, L. B. (Elmhurst, NY). *N Engl J Med* 294(15): 847-848; 1976.

1332 ESTROGENS AND ENDOMETRIAL CARCINOMA (Letter to Editor). (Eng.) Steckel, R. J. (UCLA Cancer Center, Los Angeles, CA). *N Engl J Med* 294(15): 848; 1976.

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1334 ESTROGENS AND ENDOMETRIAL CARCINOMA (Letter to Editor). (Eng.) Shanklin, D. R. (Chicago Lying-in Hosp., Chicago, IL). *N Engl J Med* 294(15): 847; 1976.

1335 PERSISTENT VAGINAL CORNIFICATION IN MICE TREATED WITH ESTROGEN PRENATALLY. (Eng.) Kimura, T. (Dept. Biology, Coll. General Education, Univ. Tokyo, Meguroku, Tokyo 153, Japan). *Endocrinol Jpn* 22(6): 497-502; 1975.

1336 FACTORS AFFECTING OESTROGEN SYNTHESIS IN HUMAN BREAST (Letter to Editor). (Eng.) Miller, W. R. (Dept. Clinical Surgery, Univ. Edinburgh, Edinburgh, Scotland); Telford, J.; Shivas, A. A. *Br J Surg* 63(2): 153; 1976.

1337 LIVER TUMORS IN YOUNG WOMEN ON CONTRACEPTIVE STEROIDS (Abstract). (Eng.) Christopherson, W. M. (Univ. Kentucky, Lexington, KY); Mays, E. T.; Barrows, G. *Lab Invest* 34(3): 343; 1976.

1338 PARATHYROID HORMONE-RESPONSIVE ADENYLATE CYCLASE IN INDUCED TRANSPLANTABLE OSTEOGENIC RAT SARCOMA. (Eng.) Martin, T. J. (Depts. Chemical Pathology, Pathology and Zoology, Univ. Sheffield, Sheffield S10 2RX, United Kingdom); Ingleton, P. M.; Underwood, J. C. E.; Michelangeli, V. P.; Hunt, N. H.; Melick, R. A. *Nature* 260(5550): 436-438; 1976.

1339 CULTIVATION AND CHARACTERIZATION OF TWO DISTINCT CELL LINES FROM A SINGLE MOUSE RECTAL TUMOR NODULE (Abstract). (Eng.) Eng, C. P. (Allegheny General Hosp., Pittsburgh, PA 15212); Harnaha, J. B. *In Vitro* 12(4): 292; 1976.

1340 ELECTRON MICROSCOPIC STUDIES ON EXPERIMENTAL GASTRIC CANCER OF THE GLANDULAR STOMACH IN RATS. (Eng.) Hananouchi, M. (Nagoya City Univ. Medical Sch., Nagoya, Japan). *Nagoya Med J* 19(4): 169-174; 1974.

1341 PERIODICAL OBSERVATIONS OF THE GLANDULAR STOMACH IN RATS TREATED WITH N-METHYL-N'-NITRO-N-NITROSOGUANIDINE. (Eng.) Shirai, T. (Nagoya City Univ. Medical Sch., Nagoya, Japan). *Nagoya Med J* 19(4): 155-175; 1974.

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1343 INACTIVATION OF LAMBDA PHAGE INFECTIVITY AND LAMBDA DEOXYRIBONUCLEIC ACID TRANSFECTION BY N-METHYL-ISATIN β-THIOSEMICARBAZONE-COPPER COMPLEXES. (Eng.) Levinson, W. (Dept. Microbiology, Univ. California, San Francisco, CA 94143); Helling, R. *Antimicrob Agents Chemother* 9(1): 160-163; 1976.

1344 EXPERIMENTAL CARCINOGENESIS IN DUCT-ARTERY LIGATED RAT SUBMANDIBULAR GLAND. (Eng.) Englander, A. (Tufts Univ. Sch. Dental Medicine, Boston, MA 02111); Cataldo, E. *J Dent Res* 55(2): 229-234; 1976.

1345 A PHYSICOCHEMICAL METHOD FOR EVALUATING DEGRADATION AND CARCINOGENIC ACTIVITY OF POLYCYCLIC HYDROCARBONS. (Rus.) Paal'me, L. P. (Inst. Chemistry, Acad. Sciences, ESSR USSR); Kirso, U. E.; Karu, T. I.; Gubergrits, M. Ia. *Vopr Onkol* 21(10): 56-62; 1975.

1346 ACCELERATION OF THE PROCESS OF DETERMINATION OF CARCINOGENICITY OF PREPARATIONS STUDIED. (Rus.) Finogenova, M. A. (Lab. Carcinogens, Inst. Nutrition, Acad. Medical Sciences USSR, Moscow, USSR). *Biull Eksp Biol Med* 80(12): 70-72; 1975.

1347 THE RELATIONSHIP BETWEEN CHROMOSOME NUMBERS AND $S + G_2$ CELL TRANSIT-TIMES IN THE POLYPLOID MCA-RAT SARCOMA IN VITRO (Abstract). (Eng.) Sklarew, R. J. (Goldwater Memorial Hosp., Roosevelt Island, NY 10017); Hoffman, J.; Post, J. *In Vitro* 12(4): 325; 1976.

1348 PROFILES OF PROTEIN BIOSYNTHESIS IN ISONIAZID (INH) AND HYDRAZINE SULFATE (HS) TREATED MICE. (Eng.) D'Souza, R. A. (Cancer Res. Inst., Tata Memorial Center, Parel, Bombay 400 012, India); Bhide, S. V. *Indian J Cancer* 12(4): 439-445; 1975.

1349 ANGIOSARCOMA OF THE LIVER AFTER VINYL CHLORIDE EXPOSURE: REPORT OF A CASE AND REVIEW OF THE LITERATURE (Abstract). (Eng.) Noria, D. F. (Central Hosp., Toronto, M5A 2S5 Canada); Ritchie, S.; Silver, M. D. *Lab Invest* 34(3): 346; 1976.

1350 ANGIOSARCOMA OF THE LIVER IN P.V.C. FABRICATORS (Letter to Editor). (Eng.) Baxter, P. J. (Employment Medical Advisory Service, 1 Chepstow Place, London W2 4TF, England); Fox, A. J. *Lancet* 1(7953): 245-246; 1976.

1351 DIMETHYLNITROSAMINE-DEMETHYLASE: ABSENCE OF INCREASED ENZYME CATABOLISM AND MULTIPLICITY OF EFFECTOR SITES IN REPRESSION. HEMOPROTEIN INVOLVEMENT. (Eng.) Argus, M. F. (U. S. Public Health Service Hosp., 210 State St., New Orleans, LA 70118); Arcos, J. C.; Pastor, K. M.; Wu, B. C.; Venkatesan, N. *Chem Biol Interact* 13(2): 127-140; 1976.

1352 SEQUENTIAL STUDY OF DIETHYLNITROSAMINE HEPATOCARCINOGENESIS IN THE RHESUS MONKEY (Abstract). (Eng.) Ruebner, B. H. (Sch. of Medicine, Univ. of Calif., Davis, CA); Kanayama, R.; Michas, C.; Bannasch, P. *Lab Invest* 34(3): 327; 1976.

1353 METABOLISM OF NITROSAMINES IN VIVO. V. INVESTIGATION ON $^{14}CO_2$ EXHALATION, LIVER RNA LABELLING AND ISOLATION OF TWO METABOLITES FROM URINE AFTER ADMINISTRATION OF [2,5-^{14}C-]-DINITROSOPIPERAZINE TO RATS. (Eng.) Krueger, F. W. (Institut fuer Toxikologie und Chemotherapie am Deutschen Krebsforschungszentrum, Heidelberg, W. Germany); Bertram, B.; Eisenbrand, G. *Z Krebsforsch* 85(2): 125-134; 1976.

1354 INDUCTION OF ORNITHINE DECARBOXYLASE (ODC) IN SYRIAN HAMSTER EMBRYO CELL CULTURES (Abstract). (Eng.) O'Brien, T. G. (Wistar Inst., Philadelphia, PA 19104); Diamond, L. *In Vitro* 12(4): 315; 1976.

1355 METABOLISM OF DRUGS, CARCINOGENS AND ENVIRONMENTAL POLLUTANTS IN CELL CULTURE (Abstract). (Eng.) Nebert, D. W. (Developmental Pharmacology Branch, NICHD, Natl. Insts. Health, Bethesda, MD 20014); Kano, I.; Guenthner, T. M.; Owens, I. S. *In Vitro* 12(4): 322; 1976.

1356 LUNG CANCER FOLLOWING EXPOSURE TO CHLOROMETHYL METHYL ETHER: AN EPIDEMIOLOGICAL STUDY. (Eng.) DeFonso, L. R. (Rohm and Haas Co., Independence Mall West, Philadelphia, PA 19105); Kelton, S. C., Jr. *Arch Environ Health* 31(3): 125-130; 1976.

1357 EFFECT OF MUSTINE (HN2) AND ITS MONOFUNCTIONAL ANALOGUE (HN1) ON TEMPLATE ACTIVITY OF CHROMATIN AND DNA IN AN RNA-POLYMERASE SYSTEM IN VITRO. (Eng.) Sokolov, N. A. (Inst. Medical Genetics, Acad. Medical Sciences USSR, Moscow, USSR); Piker, E. G.; Mironov, N. M.; Tseitlin, P. I. *Bull Exp Biol Med* 80(8): 975-978; 1976.

1358 SELECTION AND CHARACTERIZATION OF CHINESE HAMSTER OVARY CELLS RESISTANT TO METHOTREXATE (Abstract). (Eng.) Siminovitch, L. (Dept. Medical Genetics, Univ. Toronto, Toronto, Ontario, Canada M5S 1A8); Flintoff, W. *In Vitro* 12(4): 282; 1976.

1359 RAPID DEVELOPMENT OF HYPERPLASTIC NODULES AND CIRRHOSIS IN THE LIVER OF RATS TREATED CONCURRENTLY WITH THIOACETAMIDE AND THE PYRROLIZIDINE ALKALOID LASIOCARPINE. (Eng.) Reddy, J. K. (Univ. Kansas Medical Center, Kansas City, KA 66103); Rao, M. S.; Jago, M. V. *Int J Cancer* 17(5): 621-625; 1976.

1360 EFFECTS OF ECHINODERM EXTRACTS ON CELL LINES (Abstract). (Eng.) Cecil, J. T. (New York Zoological Society, Brooklyn, NY 11224); Ruggieri, G. D.; Nigrelli, R. F. *In Vitro* 12(4): 338; 1976.

1361 EFFECT OF TRIETHYLENEPHOSPHORAMIDE ON SPERMATOZOA OF RABBITS IN VITRO. (Rus.) Nizhnik, G. V. (Lab. Radiobiology and Cytology, Inst. Biological Physics, Acad. Sciences USSR, Moscow, USSR); Kononov, V. P. *Arkh Anat Gistol Embriol* 69(8): 96-101; 1975.

1362 FORMATION OF CYANAMIDES FROM SECONDARY AMINES IN HUMAN SALIVA. (Eng.) Wishnok, J. S. (Dept. Nutrition and Food Sci., Massachusetts inst. Technology, Cambridge, MA 02139); Tannenbaum, S. R. *Science* 191(4232): 1179-1180; 1976.

1363 OBSERVATIONS ON THE IN VITRO AND IN VIVO CONVERSION OF CERTAIN WIDELY USED DRUGS INTO POTENTIALLY DANGEROUS CARCINOGENS (Abstract). (Eng.) Serfontein, W. J. (Dept. Chemical Pathology, Univ. Pretoria, South Africa); de Villiers, L. S. *S Afr Med J* 50(7): 221; 1976.

1364 CHARACTERIZATION OF VARIOUS STAGES PRECEDING RAT LIVER EPITHELIAL CELL TRANSFORMATION (Abstract). (Eng.) Okigaki, T. (Pasadena Foundation Medical Res., Pasadena, CA 91101); Tokes, Z. *In Vitro* 12(4): 296; 1976.

1365 GROWTH OF NORMAL AND CHEMICALLY TRANSFORMED HAMSTER CELLS IN LIQUID AND SEMISOLID MEDIA (Abstract). (Eng.) Sabharwal, P. S. (Univ. Kentucky, Lexington, KY 40506); Papadopoulo, D.; Garrett, N. E.; Rudert, C.; Levy, S.; Markovits, P.; Hubert-Habart, M. *In Vitro* 12(4): 326; 1976.

See also:

* (Rev): 1201, 1202, 1203, 1205, 1206, 1207, 1208, 1209, 1210, 1211, 1212, 1213, 1214, 1215, 1216, 1217, 1218, 1219, 1220, 1221, 1244, 1245, 1246, 1247, 1248, 1249, 1250, 1251, 1252, 1253, 1254, 1255, 1256
* (Viral): 1435, 1448, 1451
* (Immun): 1474, 1483, 1497, 1510, 1511, 1513, 1530, 1531
* (Path): 1588, 1636, 1642, 1650
* (Epid-Biom): 1677, 1683, 1687, 1691, 1692, 1694, 1695, 1703, 1704

1366 CHROMOSOME DAMAGE PRODUCED BY PSORALEN AND ULTRAVIOLET LIGHT (Letter to Editor). (Eng.) Ashwood-Smith, M. J. (Dept. Biology, Univ. Victoria, Victoria, B.C., Canada); Grant, E. *Br Med J* 1(6005): 342-343; 1976.

Extensive chromosome damage was produced in Chinese hamster cells in tissue culture by psoralen and black light. When the cells were exposed to graded doses of long-wave UV light (320-360 nm) in the presence of 34.4 μg psoralen/ml, the proportion of cells showing micronuclei ranged from 6.5% after a dose of 1.34×10^{-10} J/m^2 to 45.2% after a dose of 3.62×10^{-10} J/m^2. These results suggest that caution be exercised in the use of light therapy combined with psoralen in the treatment of psoriasis as this somatic chromosome damage may result, after clonal selection, in later malignancy.

1367 DNA REPAIR IN LATE-PASSAGE HUMAN CELLS. (Eng.) Hart, R. W. (Dept. Radiology, Ohio State Univ., Columbus, Ohio 43210); Setlow, R. B. *Mech Ageing Dev* 5(1): 67-77; 1976.

Monolayer cultures of WI-38 cells from passages 18 to 60 were exposed to UV radiation, or to N-acetoxy-AAF, or to gamma-rays. The cultures were incubated in ^{3}H-thymidine, and unscheduled DNA synthesis--a measure of DNA repair--was measured radioautographically. Late passage cultures showed less repair, and many cells showed none. Double-label radioautographs indicated that there is an excellent correlation between cells (unexposed to UV radiation and labeled with ^{14}C-thymidine) that do scheduled synthesis and cells that do unscheduled DNA synthesis. These results may indicate that failure of repair is not a causal event in the failure of late passage cells to divide, but that as cells age the ability to do the many coordinated steps in repair declines. However, this is not a universal finding for all types of repair. Old and young nerve cells are equally adept at repairing strand breaks.

1368 GAMMA-RAY MUTAGENESIS IN BACTERIOPHAGE T4. (Eng.) Conkling, M. A. (Dept. Microbiology, Univ. Illinois, Urbana, IL 61801); Grunau, J. A.; Drake, J. W. *Genetics* 82(4): 565-575; 1976.

To better determine the mutation pathways and the mechanisms by which mutations arise in ionizing radiation mutagenesis, the authors selected bacteriophage T4 because of the high resolving power of the rII system and the availability of mutants that perturb the mutation process itself. Gamma irradiation of the T4 bacteriophage induces r mutations at a linear rate of 12.6×10^{-9} per rad. Phage T4B, maintained and titered on *Escherichia coli* BB, was irradiated with a ^{137}Cs source at a dose rate of 3560 rads/min. Mutants were identified by preadsorbing to and then plating on B cells by the supersoft agar overlay method. The point mutation rate for bacteriophage T4 was estimated to be 1.5×10^{-9}/locus/rad. Mutation probably occurs by mechanism involving misrepair. The radiation-induced mutation rates for bacteriophage T4 were compared with similar data previously obtained in other bacteriophage systems; i.e., T2, SD, ϕX174, and serratiaphage kappa. Most of the reported values group around 10^{-11} mutations/base pair/rad.

1369 STRUCTURAL TRANSITIONS IN DNA ISOLATED FROM NORMAL AND TUMOR CELLS. (Rus.) Mil', E. M. (Inst. Chemical Physics, Acad. Sciences USSR, Moscow, USSR); Bobovich, Iu. M.; Krinitskaia, L. A.; Zhil'tsova, V. M.; Zhizhina, G. P.; Krugliakova, K. E. *Biofizika* 20(5): 757-761; 1975.

The authors studied the configurational damage in DNA isolated from normal and leukemic cells and then exposed to gamma rays. Structural transition in leukemic DNA cells began earlier than in normal DNA cells, with the decreased temperature transition of the leukemic DNA cells (in comparison with normal cells) attesting either to the greater lability of the macromolecular or to the increased number of defects in it. The latter proposal is consistent with data obtained by the kinetic formaldehyde method. The spin label method can be used to analyze the DNA macromolecule damaged by small doses of radiation. Varying radiosensitivity of DNA isolated from leukemic and normal cells and varying initial states of DNA macromolecules were observed.

1370 ELECTROPHORETIC MOBILITY OF IRRADIATED ERYTHROCYTES AND EHRLICH ASCITES TUMOUR CELLS. (Eng.) Walesby, R. K. (Royal Postgraduate Medical Sch. and Hammersmith Hosp., Du Cane Road, London W12 OHS, England); Newman, D. L. *Biochem Biophys Res Commun* 69(1): 26-34; 1976.

The effects of 600-rad/min x-irradiation, 5150 rad/min γ-irradiation, and 20.4-rad/min β-irradiation on human RBC, nucleated cockerel RBC, and Ehrlich murine ascites tumor cells (cultured in I.C.I. albino mice) were investigated. Both RBC species were suspended in phosphate buffer during irradiation; the ascites cells were irradiated in the ascitic fluid. The x- and γ-irradiations produced essentially the same response in all the cells, the maximum mobility change taking place at 40-60 Krads. Before they returned to normal levels, the mobility of cockerel RBC was increased by irradiation, while that of human RBC and ascites cells was decreased. The response curves of the ascites cells were somewhat similar to those of human erythrocytes following x- and γ-irradiation, but β-irradiation resulted in a continuing decrease in mobility over the dose range 0-4 Krads. The dose required to produce a specific mobility change was less than that for either x- or γ-irradiation by a factor of 20.

1371 POSTRADIATION ATYPICAL AND MALIGNANT SCHWANNOMAS (Abstract). (Eng.) Woodruff, J. M. (Memorial Sloan-Kettering Cancer Center, New York, NY 10021); Foley, K. M.; Posner, J. B. *Lab Invest* 34(3): 338; 1976.

1372 CHROMOSOMAL ABERRATIONS IN CELLS OF MONKEYS SURVIVING ACUTE RADIATION UNDER CHEMICAL PROTECTION. (Eng.) Kosichenko, L. P. (Inst. Experimental Pathology and Therapy, Acad. Medical Sciences USSR, Sukhumi, USSR); Semenov, L. F. *Bull Exp Biol Med* 80(8): 979-982; 1976.

1373 SARCOMA ARISING IN IRRADIATED JAWBONES. POSSIBLE RELATIONSHIP WITH PREVIOUS NON-MALIGNANT BONE LESIONS: REPORT OF 6 CASES AND REVIEW OF THE LITERATURE. (Eng.) De Lathouwer, C. (Rue de la Tour Japonaise, 14, B-1120 Bruxelles, Belgium); Brocheriou, C. *J Maxillofac Surg* 4(1): 8-20; 1976.

1374 ULTRAVIOLET LIGHT CARCINOGENESIS IN HAIRLESS MICE: CELL KINETICS DURING INDUCTION AND PROGRESSION OF SQUAMOUS CELL CARCINOMA AS ESTIMATED BY THE DOUBLE-LABELING METHOD. (Eng.) Chopra, D. P. (Kettering-Meyer Lab., Southern Res. Inst., Birmingham, AL 35205). *J Invest Dermatol* 66(4): 242-247; 1976.

1375 FERRUGINOUS (ASBESTOS) BODIES IN THE LUNGS OF RURAL DWELLERS, URBAN DWELLERS, AND PATIENTS WITH PULMONARY NEOPLASMS. (Eng.) Breedin, P. H. (North Carolina Baptist Hosp., Winston-Salem, NC); Buss, D. H. *South Med J* 69(4): 401-404; 1976.

1376 AGING IN VITRO: ANALOGY BETWEEN THE DIVISION POTENTIAL OF CELLS AND SURVIVAL AFTER IONIZING RADIATION (Abstract). (Eng.) Macieiracoelho, A. (INSERM (U50), 94800 Villejuif, France); Diatloff, C.; Malaise, E. *In Vitro* 12(4): 301; 1976.

1377 GENETIC DAMAGE AND MAMMALIAN CELL SURVIVAL CURVES. (Eng.) Burki, J. H. In: *Cell Survival after Low Doses of Radiation: Theoretical and Clinical Implications*. Edited by T. Alper. Institute of Physics. (London, England): 209-216; 1974.

See also:

* (Rev): 1214, 1219, 1220, 1236, 1256
* (Viral): 1439
* (Immun): 1513
* (Path): 1595, 1621
* (Epid-Biom): 1697, 1699, 1702

1378 INVESTIGATION OF THE NATURE OF MEMBRANE CELLULAR ANTIGENS INDUCED BY AVIAN SARCOMA-LEUKEMIA COMPLEX VIRUSES. (Rus.) Shaginian, O. V. (N. F. Gamaleia Inst. Epidemiology and Microbiology, Acad. Medical Sciences USSR, Moscow, USSR); Kriukova, I. N. *Vopr Virusol* (6): 710-715; 1975.

Using immunofluoresence and cross adsorption, researchers studied the appearance in chick embryo cells of common membrane cellular antigen (MCA) coded for by avian sarcoma-leukemia virus genome. They also investigated the biological function of MCA by examining the antibody to it in a microcytotoxic test in Rous tumor cells of different strains of C3H mice. Commercial (10) and nonleukemic (11) chick embryos were studied individually. Nine nonleukemic chick embryo cells did not inhibit blood serum activity and, therefore, did not contain MCA. The cells of the other two possessed significant absorption capacity following cultivation in vitro. In contrast to the nine nonleukemic embryos, commercial cells inhibited the activity of immune blood serum and contained MCA in common with mice tumor cells. MCA was also found in normal chick embryo cells after their propagation in vitro. The findings demonstrate the possibility of detecting membrane antigens specific for avian sarcoma-leukemia viruses in the absence of morphologic transformation by the absorption test. The antigen may be synthesized during functional activation of the virus genome in cells.

1379 MAPPING OF THE GENOME OF PRAGUE ROUS SARCOMA VIRUS B. (Eng.) Billeter, M. A. (Institut fuer Molekularbiologie I, Universitaet Zurich, Hoenggerberg, 8049 Zurich, Switzerland); Coffin, J. M.; Joho, R.; Weissmann, C. *Ann Microbiol* 127A(1): 5-6; 1976.

The nucleotide sequences of Rous sarcoma virus (Prague strain, subgroup B; Pr RSV-B) were demonstrated not to be permuted, but arranged in a unique order in all the subunits; 29 large oligonucleotides arising by digestion of ^{32}P-labeled 36S viral RNA subunits with RNase T$_1$ and isolated by two-dimensional polyacrylamide gel electrophoresis were found to be located at defined distances relative to the poly A tract of the RNA molecule. A tentative physical map indicating the relative positions of these markers was constructed. To localize biological functions, five recombinants between Pr RSV-B and the nontransforming Rous associated virus, type 1, subgroup A (RAV-1) were selected for their ability to transform cells (a property of Pr RSV-B) and to grow on C/B cells (a property of RAV-1). The fingerprint analyses of the RNA of the recombinants showed that they all retained a Pr RSV-B-specific region near the poly A, which therefore must comprise the genetic information required for transformation. On the other hand, all recombinants lost a Pr RSV-B-specific region near the middle of the genome, simultaneously acquiring RAV-1-specific oligonucleotides, which must define the RNA section determining growth capacity on C/B cells, presumably the envelope glycoproteins. This general approach should permit the localization of other biological functions.

1380 A PHYSICAL MAP OF THE ROUS SARCOMA GENOME. (Eng.) Coffin, J. M. (Sch. Medicine, Tufts Univ., Boston, MA 02111); Billeter, M. A. *J Mol Biol* 100(3): 293-318; 1976.

The organization of the genome of Rous sarcoma virus (Prague strain, subgroup B) was investigated by locating the position of 29 large oligonucleotides, obtained by the digestion of 36S viral RNA with ribonuclease T$_1$, relative to the polyadenylic acid segment of the RNA. A unique arrangement of the oligonucleotides was found, demonstrating that all the 36S RNA subunits are similar in their sequences and are not permuted. A physical map of the genome was constructed; the three oligonucleotides absent in a transformation-defective variant of the virus were located in a region near the 3' end of the RNA.

1381 THE ROLE OF CYCLIC NUCLEOTIDES IN CELL GROWTH AND DEVELOPMENT: REGULATION AND CHARACTERIZATION OF CYCLIC NUCLEOTIDE PHOSPHODIESTERASES IN MAMMALIAN CELLS. (Eng.) Strada, S. J.; Pledger, W. J. In: *Cyclic Nucleotides in Disease*. Edited by B. Weiss. (Baltimore: Univ. Park Press): pp. 3-34; 1975.

The properties of cyclic nucleotide phosphodiesterases from baby hamster kidney cells and from cells transformed by the Schmidt-Ruppin strain of the Rous sarcoma virus were examined in relation to growth mechanisms and control of enzyme activity. Enzyme activities were isolated by isoelectric procedures. Analysis of the electrofocused peaks revealed differences in the following: (a) isoelectric points, (b) substrate affinities, (c) kinetic properties, and (d) subcellular localization. Transformed, confluent baby hamster kidney cells do not display the reduced phosphodiesterase levels shown by normal cells when diluted into fresh medium, indicating a defect in a rapid regulatory control system. However, transformed cells can regulate enzyme levels on a long term basis. Addition of fresh serum (1% or 10% fetal calf serum) to cultures of normal cells decreases intracellular cyclic AMP levels and alters the kinetic profile of the phosphodiesterases. Transformed cells display identical kinetic profiles before and after the addition of serum. An extensive review of the role of cyclic nucleotides in cell growth and development is also given.

1382 BLOOD SERUM HEXOKINASE ACTIVITY IN VIRAL TUMOR-BEARING CHICKENS. (Rus.) Kniazev, P. G. (N. N. Petrov Scientific Res. Inst. Oncology, USSR Ministry Public Health, Leningrad, USSR); Pluzhnikova, G. F.; Kuznetsov, O. K. *Vopr Onkol* 21(12): 66-67; 1975.

The blood serum of ''Russian white'' chickens with Rous sarcoma and also with erythroblastosis and myeloblastosis was studied. All three groups demonstrated a reproducible increase in blood serum hexokinase activity compared with controls, with the level of hexokinase activity essentially indistinguishable in chickens with systemic diseases from the level of enzymatic activity in chickens with sarcoma. These results are consistent with the findings from previous in vitro experiments that the morphologic transformation of cultures of chicken fibroblasts caused by Rous sarcoma is accompanied by increased hexokinase activity.

1383 ROLE OF PROTEASE ACTIVITY IN MALIGNANT TRANSFORMATION BY ROUS SARCOMA VIRUS. (Eng.) Weber, M. J.; Hale, A. H.; Roll, D. E. In: *Proteases and Biological Control. Cold Spring Harbor Conferences on Cell Proliferation.* Cold Spring Harbor Lab. (Cold Spring Harbor, NY): vol. 2, pp. 915-930; 1975.

The effects of treating normal cells with proteases or other hydrolytic enzymes to induce some of the early cellular changes associated with malignant transformation by tumor viruses, as well as the reversal of some of these transformation-specific changes by protease inhibitors, were investigated. In addition, extracts of normal and transformed cells were examined for changes in proteolytic activity that might be correlated with the experimental observations. Chick embryo fibroblasts (normal or transformed by Rous sarcoma virus or by RSV-T5) were used for these studies. Experimental evidence strongly suggests that a trypsin-like protease, presumably plasmin, is involved in the decreased adhesiveness and rounded morphology of transformed cells, but not in the transformation-specific increase in hexose transport. Hexose transport was not stimulated in normal cells by plasmin or other proteolytic or hydrolytic enzymes, and protease inhibitors did not lower the hexose transport rate in transformed cells even though adhesiveness and morphology returned to normal. Another trypsin-like protease may also be involved in transformation separately from and perhaps acting prior to plasmin.

1384 DNA RELATED TO THE TRANSFORMING GENE(S) OF AVIAN SARCOMA VIRUSES IS PRESENT IN NORMAL AVIAN DNA. (Eng.) Stehelin, D. (Dept. Microbiology, Univ. California, San Francisco, CA 94143); Varmus, H. E.; Bishop, J. M.; Vogt, P. K. *Nature* 260(5547): 170-173; 1976.

DNA complementary to the transforming DNA of the Prague-C strain of avian sarcoma virus (ASV) has been hybridized to DNA isolated from normal nontransformed avian or mammalian sources. The transformation-specific DNA (cDNAsarc), which represented 16% of the total viral genome, corresponded to that portion of the genome of transformation-positive virus missing in transformation-defective deletion mutants. The extent of reaction of 0.32 ng/ml of the transforming DNA with 8 mg/ml of denatured avian or animal DNA was: 52% for chick embryo DNA, 46% for quail embryo DNA, 48% for adult turkey liver DNA, 45% for duck embryo DNA, 24% for 22-day-old emu liver and heart DNA, and less than 2% for calf thymus or mouse neonate DNA. The melting temperatures of formed hybrids (duplexes between cDNAsarc and normal DNA) were 77 C, 74 C, 71 C, and 70 C for the chick, quail, turkey, duck and emu DNA duplexes, respectively, and 81 C after hybridization to the DNA of rat cells containing transforming ASV provirus. Thus the DNA of normal chicken cells contains nucleotide sequences closely related to at least a portion of the transforming gene(s) of ASV; similar sequences are widely distributed among the DNA of avian species with a divergence that roughly corresponds to the phylogenetic distances between species. Mammalian cells do not contain similar sequences. It is suggested that part or all of the transforming gene(s) of ASV may have been derived from the chicken genome or from a species closely related to chicken, either by a process akin to transduction or by other events.

1385 THE USE OF FLUORESCAMINE AS A PROBE FOR LABELING THE OUTER SURFACE OF THE PLASMA MEMBRANE. (Eng.) Hawkes, S. P., (Lawrence Berkeley Lab., Univ. California, Berkeley, CA 94720); Meehan, T. D.; Bissell, M. J. *Biochem Biophys Res Commun* 68(4): 1226-1233; 1976.

A rapid method was developed to label the outer surface of chick embryo fibroblasts with fluorescamine without disrupting the cell monolayer. Electrophoresis resolved two distinct areas of fluorescence: a group of high molecular weight polypeptides and several rapidly migrating species. The latter were demonstrated by thin-layer chromatography to be phospholipids. Fluorescamine did not label the internal components of the cell, as evidenced by two intracellular proteins that were found to be nonfluorescent. Intact normal cells were labeled three times more than Rous Sarcoma virus transformed cells, indicating a possible loss of protein at the surface, a difference in the identity of the reactive sites and their local environments, or a difference in the geometry of the transformed cell; disrupted cells, subsequently labeled, yielded similar amounts of fluorescence.

1386 THE DYNAMICS OF ANTIBODY-INDUCED REDISTRIBUTION OF VIRAL ENVELOPE ANTIGENS IN THE PLASMA MEMBRANES OF AVIAN TUMOUR VIRUS-INFECTED CHICK EMBRYO FIBROBLASTS. (Eng.) Phillips, E. R. (McArdle Lab. Cancer Res., Univ. Wisconsin, Madison, WI 53706); Perdue, J. F. *J Cell Sci* 20(3): 459-477; 1976.

The time course of the redistribution of antigen-antibody complexes (AAC) on the surfaces of the subgroup A Rous-associated (leukosis) virus (RAV-I)-infected chick embryo fibroblasts was studied. The effect of the presence or absence of antibody in the incubation medium during re- distribution and the effects of various biologically perturbing compounds were also studied. Observation revealed a rapid and a delayed phase of redistribution. During the rapid phase (10 min or less) some of the antigen-bearing cells reorganized AAC into patches, while the remainder maintained a diffuse distribution. A fraction of the cells with either diffuse or patchy distribution also redistributed AAC into a pattern of ''marginal redistribution (MR)'', consisting of linear aggregation of AAC, at the cell edge. During the ''late'' phase of redistribution (after about 20 min), AAC began to condense into one or more foci of coalescence (FC) on each cell. As the number of cells with FC increased with time, the fraction of cells that were labeled decreased. Electromicroscopic observation of thin sections of ferritin-labeled specimens indicated that AAC were lost by endocytosis and that this process was probably related to FC formation. Inhibitors of oxidative phosphorylation, protein synthesis, RNA synthesis, or microtubule assembly had no significant effect on the patterns or the course of redistribution. Iodoacetic acid (IAA), which depletes cellular ATP, and cytochalasin B (CB), which is believed to depolymerize microfilaments, partially inhibited MR and completely prevented FC formation and endocytosis. Paradoxically, IAA or CB treated cells lost AAC very rapidly by some alternate mechanism not involving FC formation but which may entail a centrifugal migration of complexes to the cell extremities during AAC disposal.

1387 DETERMINATION OF THE MOLECULAR WEIGHT OF THE RNA SUBUNITS OF ROUS SARCOMA VIRUS BY ELECTRON MICROSCOPY. (Eng.) Jacobson, A.; Bromley, P. A. In: *Tumor Viruses. Cold Spring Harbor Symposia on Quantitative Biology.* Cold Spring Harbor Laboratory. (Cold Spring Harbor, NY): Vol. 39, pp. 845-846; 1975.

The molecular wt of the RNA subunits of Rous sarcoma virus (RSV) was determined using electron microscopy. RSV (subgroup D) labeled with ^{32}P was grown in secondary chick embryo fibroblast cultures. Virus was collected at 2.5-hr intervals. Viral RNA was extracted and centrifuged to prepare the 60-70S RNA. This RNA was denatured, precipitated, and recentrifuged; the sharp 35S subunit peak was precipitated. The intactness of the viral RNA subunits is improved when calf serum and other additives are absent from the culture medium during the period of virus release. After measurements of the viral RNA were made from an electron micrograph, the data for 93 molecules were plotted to show the fraction of total RNA as a function of molecular length in micrometers. More than 50% of the RNA is between 2.4 and 3.3 μm in length. Under these conditions, bacteriophage MS2 RNA has a length of 1.12 ± 0.09 μm. From the data, a mean length of 2.86 ± 0.23 μm was calculated for the RNA subunits of RSV and, assuming the molecular wt of MS2 RNA to be 1.2×10^6 daltons, this would correspond to a molecular wt of $3.12 \pm 0.25 \times 10^6$ daltons.

1388 TRANSLATION OF ONCOGENIC VIRUS RNA IN *XENOPUS LAEVIS* OOCYTES. (Eng.) Salden, M. (Dept. Biochemistry, Univ. Nijmegen, Geert Grooteplein Noord 21, Nijmegen, Netherlands); Asselbergs, F.; Bloemendal, H. *Nature* 259(5545): 696-699; 1976.

Specific immunoprecipitation and scintillation autoradiography were used to investigate the translation of oncogenic virus RNA in *Xenopus laevis* oocytes. Injection of native 60S avian myeloblastosis virus (AMV) RNA resulted in synthesis of virus-specific polypeptides with molecular wt of 76,000, 66,000, 32,000, 25,000, 18,000, and 12,000. Denatured 35S AMV RNA lead to the synthesis of a small quantity of the precursor polypeptide with the molecular wt of 76,000. In chick embryo fibroblasts (CEF) infected with AMV the same precursors and structural polypeptides were found as those produced after oocytes were injected with 60S AMV RNA. Incubation of native 60S AMV RNA in a reticulocyte cell-free system resulted in the synthesis of the same precursors and structural polypeptides found in the oocyte system but in different proportions. The processing of AMV precursors in the oocyte and in CEF appears almost identical, whereas in the reticulocyte system no cleavage occurs. It was concluded that AMV RNA is translated into several precursor polypeptides which are cleaved into structural viral proteins, presumably by the same relatively unspecific enzymes present in chick embryo fibroblasts, oocytes, and reticulocytes.

1389 MECHANISM OF INTERACTION OF AVIAN MYELOBLASTOSIS VIRUS REVERSE TRANSCRIPTASE WITH AVIAN MYELOBLASTOSIS VIRUS RNA. (Eng.) Yamaura, I. (Sloan-Kettering Inst. for Cancer Res., Rye, NY 10580); Cavalieri, L. F. *J Virol* 18(1): 26-33; 1976.

The synthesis of DNA on avian myeloblastosis virus (AMV) RNA as the primer-template using AMV reverse transcriptase in vitro was examined as a function of the concentrations of these components, as well as a function of the ionic strength of the assay medium. The results were consistent with the hypothesis that two types of sites exist on the AMV RNA: inactive ''dead-end'' sites that merely bind the enzyme, and active binding sites that lead to DNA synthesis. Velocity sedimentation studies of reverse transcriptase revealed that the enzyme became a dimer (or oligomer) at low salt concentrations, and it was at these concentrations that the two types of sites were evident on the RNA. At high salt concentration the enzyme, which exists primarily as a monomer, was inactive with AMV RNA, although it was active when poly(rA)dT_{10} was used as the primer-template. Inactive sites were found not to be due to binding of the reverse transcriptase to nicked regions or to partially denatured RNA molecules. It is concluded that inactive sites are those containing incorrect 4S primer molecules. These results are discussed in terms of the mechanism of the interaction of the reverse transcriptase with AMV RNA.

1390 LACK OF CORRELATION BETWEEN MAREK'S DISEASE TUMOR INDUCTION AND EXPRESSION

OF ENDOGENOUS AVIAN RNA TUMOR VIRUS GENOME. (Eng.) Calneck, B. W. (Houghton Poultry Res. Station, Houghton, Huntingdon, Cambs., PE17 2DA, England); Payne, L. N. *Int J Cancer* 17(2): 235-244; 1976.

Infection with Marek's disease virus (MDV) and subsequent tumor development failed to induce the expression of endogenous avian RNA tumor virus genome in Line-151 and Line-7 chickens which lacked such expression at 1 day of age. Titers of avian leukosis virus (ALV) group-specific (gs) antigen detected by the complement fixation for avian leukosis test and expression of chick helper factor (chf) activity remained relatively constant in birds which expressed these genome functions at hatching time. Endogenous ALV belonging to the E-subgroup was isolated from two of 50 birds; both were controls not exposed to MDV. There was no correlation between expression of ALV genome (gs or chf) at 1 day of age and the rate of tumor development subsequent to MDV infection. It is concluded that MDV infection can induce tumors without the participation of endogenous ALV genome.

1391 STUDIES OF CELLULAR DIFFERENTIATION BY AUTOMATED CELL SEPARATION. TWO MODEL SYSTEMS: FRIEND VIRUS-TRANSFORMED CELLS AND *HYDRA ATTENUATA*.

(Eng.) Arndt-Jovin, D. J. (Max-Planck-Institut f. Biophysikalische Chemie, 34 Goettingen, Postfach 968, W. Germany); Ostertag, W.; Eisen, H.; Klimek, F.; Jovin, T. M. *J Histochem Cytochem* 24(1): 332-347; 1976.

The automated high-speed analysis and separation of cells on the basis of spectroscopic parameters was applied to studies of cellular differentiation in two systems. The temporal changes following induction of differentiation by dimethylsulfoxide in the Friend virus-transformed erythroid cells were quantitated by multiparameter analysis leading to the separation of discrete subpopulations. Thus, following induction, cell size decreased as measured by light scattering, the number of H-2 histocompatibility antigen sites decreased as measured by indirect fluorescent antibody binding, the number of lectin-binding sites per cell increased as measured by fluorescein-labeled concanavalin A and the microviscosity of the hydrocarbon region of the plasma membrane increased as determined by the fluorescence emission anisotropy of the membrane probe 1,6-diphenyl-1,3,5-hexatriene. Cells were separated on the basis of several of these parameters and analyzed for their hemoglobin content by benzidine staining. Examination of cells separated according to the anisotropy parameter showed that high anisotropy values were correlated with (a) small cell size, (b) positive staining with benzidine, and (c) pronounced reactivity with fluorescent antibody to the RBC protein spectrin. Disaggregated cells from Hydra attenuata were selectively stained with rhodanile blue, 7-(p-methoxybenzylamino)-4-nitrobenz-2-oxa-1, 3-diazole and fluorescamine. Distribution analyses and preliminary separations indicated the feasibility of obtaining homogeneous classes of cell types in a viable state. The experiments with emission anisotropy represent the first analyses and separations of single cells on the basis of fluorescence polarization.

1392 INCOMPLETE VIRAL SYNTHESIS IN FRIEND LEUKEMIA VIRUS-INDUCED RETICULUM CELL SARCOMAS.

(Eng.) Black, D. R. (Life Sciences Div., Stanford Res. Inst., Menlo Park, CA 94025); Fieldsteel, A. H. *Int J Cancer* 17(2): 245-253; 1976.

The level of Friend leukemia virus (FV) expression in the FVTCT-BALB cell line (FV-induced reticulum cell sarcoma cells from BALB/c mice) was studied to clarify the process of FV retrieval. ^{3}H-uridine labeling techniques and reverse transcriptase assays showed that FVTCT-BALB cells did not release C-type virus particles. Nucleic acid hybridization techniques demonstrated that the level of viral RNA synthesis in the FVTCT-BALB nonproducer cell line was indistinguishable from that in cell lines productively infected with MLVs. These data suggest that in the FVTCT-BALB cell line the synthesis of FV is blocked in some late stage of virus assembly.

1393 LOW-MOLECULAR-WEIGHT RAUSCHER LEUKEMIA VIRUS PROTEIN WITH PREFERENTIAL BINDING FOR SINGLE-STRANDED RNA AND DNA.

(Eng.) Davis, J. (Univ. Texas System, Texas Medical Center, Houston, TX 77025); Scherer, M.; Tsai, W. P.; Long, C. *J Virol* 18(2): 709-718; 1976.

A sensitive nitrocellulose filter assay that measures the retention of ^{125}I single-stranded calf thymus DNA was used to detect and purify DNA-binding proteins that retain a biological function from Rauscher murine leukemia virus. By consecutive purification on oligo(dT)-cellulose and DEAE-Bio-Gel columns and centrifugation in 10-30% glycerol gradients, RNA-dependent DNA polymerase was separated from a second virion DNA-binding protein. The binding of this protein to DNA was strongly affected by NaCl concentration but showed little change in activity over a wide range of temperature (15-40 C) or pH (5-10). After glycerol gradient purification, polyacrylamide gel electrophoresis of this protein showed one major band with a molecular weight of approximately 9,800. This protein bound about as well to single-stranded *Escherichia coli* or calf thymus DNA or 70S type C viral RNA. The binding to ^{125}I single-stranded calf thumus DNA was very efficiently inhibited by unlabeled single-stranded DNA from either *E. coli* or calf thymus and by 70S murine or feline viral RNA. Much larger amounts of double-stranded DNA were required to produce an equivalent percentage of inhibition. This protein, therefore, shows preferential binding to single-stranded DNA or viral RNA.

1394 N-TROPIC VARIANTS OBTAINED AFTER CO-INFECTION WITH N- AND B-TROPIC MURINE LEUKEMIA VIRUSES.

(Eng.) Hopkins, N. (Center Cancer Res., Massachusetts Inst. Technology, Cambridge, MA 02139); Traktman, P.; Whalen, K. *J Virol* 18(1): 324-331; 1976.

Sc-1 cells coinfected with small XC plaque-forming N-tropic and large XC plaque-forming B-tropic murine leukemia viruses produced, in addition to parental types, progeny with the phenotype, large XC plaque morphology, and N tropism. This phenotype remained stable through end point titration and plaque purification on NIH/3T3 cells and growth on BALB/3T3 cells. These N-tropic viruses (XLP-N virus) grow to unusually high titer and make very large XC plaques. There are several possible explanations for the origin of the XLP-N virus, the simplest of which is genetic recombination between plaque morphology and tropism markers of the parental strains. Heterozygosis is a possibility or, during coinfection, B-tropic viruses may have caused a genetic alteration in the growth and plaque-forming properties of N-tropic viruses by a method other than those mentioned. There is also the possibility that XLP-N arose from a genetic exchange between the infecting virus and an endogenous virus of Sc-1 cells.

1395 ANTIBODY IN THE SERA OF TUMOR-BEARING MICE THAT MEDIATES SPLEEN CELL CYTOXICITY TOWARD THE AUTOLOGOUS TUMOR.

(Eng.) Blair, P. B. (Dept. Bacteriology and Immunology, Univ. California, Berkeley, CA 94720); Lane, M. A.; Mar, P. *J Immunol* 116(3): 606-609; 1976.

Pretreatment of MTV-induced BALB/cfC3H mammary tumor cells with autologous serum caused increased spleen cell cytotoxic activity and the recruitment of previously inactive spleen cells to cytotoxic activity against the target cells. These recruiting antibodies were tumor-specific for individual tumors; pretreatment with such serum of target cells of an MTV-induced mammary tumor obtained from a different BALB/cfC3H female resulted in blocking of spleen cell activity. The autologous recruiting factors were active at dilutions of 1000 or more of whole serum and were found in the 19S fraction after gel filtration.

1396 SUPPRESSION OF MIXED LYMPHOCYTE RESPONSE IN MICE BEARING PRIMARY TUMORS INDUCED BY MURINE SARCOMA VIRUS.

(Eng.) Fernbach, B. R. (Lab. Cell Biology and Lab. Immunodiagnosis, Natl. Cancer Inst., Bethesda, MD 20014); Kirchner, H.; Bonnard, G. D.; Herberman, R. B. *Transplantation* 21(5): 381-386, 1976.

The immune responses of mice bearing primary tumors were studied in mixed lymphocyte culture (MLC), since this system represents a well defined in vitro model of recognition of cell-associated antigens and of generation of cytotoxic lymphocytes. MLC responses of spleen cells from C57BL/6N mice bearing tumors induced by murine sarcoma virus of the Moloney type (MSV) against allogeneic spleen cells were found to be markedly depressed, as estimated by three parameters: lymphoblast counts, H-thymidine incorporation (TI), and cell-mediated lysis (CML). Although all three parameters were definitely depressed in comparison to the normal controls, TI was depressed to a greater degree than lymphoblast counts and CML. MSV spleen cells also had a suppressive effect on the MLC responses of normal spleen cells in third party experiments. The cells mediating this effect were radioresistant non-T cells, which were removed by adherence columns and inactivated by carrageenan. These data suggest that the suppressor cells were macrophages. Serum from MSV tumor-bearing mice had a greater suppressive effect than did normal mouse serum. Both the suppressor cells and the suppressive serum factors may play an important role in the immunosuppression observed in tumor-bearing hosts.

1397 GLYCOLIPID GLYCOSYL TRANSFERASES OF A HAMSTER CELL LINE IN CULTURE. I. KINETIC CONSTANTS, SUBSTRATE AND DONOR NUCLEOTIDE SUGAR SPECIFICITIES.

(Eng.) Chandrabose, K. A. (Imperial Cancer Res. Fund Lab., P.O. Box No. 123, Lincoln's Inn Fields, London WC2A 3PX, England); Macpherson, I. A. *Biochim Biophys Acta* 429(1): 96-111; 1975.

The properties of transferases catalyzing the transfer of a galactose from uridine diphosphate galactose to exogenous ceramide monohexoside and ceramide dihexoside were studied. Homogenates or microsomes were prepared from confluent cultures of clones of the NIL 2-Syrian hamster line and a derivative clone NIL-2-HSV, transformed by Hamster Sarcoma virus. Identities of enzyme products were determined by RF values in several thin-layer chromatographic systems as well as by immunodiffusion analysis. Reaction I, the synthesis of dihexoside, had a pH optimum of 5.9-6.1, and reaction II, the synthesis of trihexoside, 6.0-6.4. Km values for uridine diphosphate galactose were 2.2 action II. Heat sensitivities were markedly different for each reaction, and the ratio of the two activities differed in untreated and detergent-treated preparations. Transformed cells did not exhibit reaction II activity. The evidence suggests that two different transferases are catalyzing reactions I and II.

1398 DNA POLYMERASE ACTIVITY IN PLASMA FROM LEUKAEMIC GUINEA-PIGS.

(Eng.) Hallinan, F. M. (Dept. Biology, Univ. Southampton, Bassett Crescent East, Southampton, S09 3TU, England); Maclean, N. *Br J Cancer* 33(4): 419-426; 1976.

Measurement of DNA polymerase in leukemic guinea-pig plasma (taken from animals in the terminal stage) revealed the presence of low levels of sedimentable and nonsedimentable enzymic activities. Since the sedimentable DNA polymerase was ribonuclease sensitive, used poly(C)•oligo(dG) as template, and banded in a sucrose density gradient at 1.17 g/ml, it is thought to be the guinea-pig leukemia virus-associated reverse transcriptase. The soluble DNA polymerase was stimulated by ribonuclease and is probably of cellular origin.

1399 PROTEINS SOLUBILIZED FROM FROG VIRUS 3 PARTICLES: EFFECT ON TRANSCRIPTION.

(Eng.) Aubertin, A. M. (Laboratoire de Virologie et Groupe de Recherches U 74 sur la Pathogenie des Infections Virales, 67000 Strasbourg, France); Travo, C.; Kirn, A. *J Virol* 18(1): 34-41; 1976.

The effects of a soluble viral extract from frog virus 3 particles (SVE) on the different steps of RNA synthesis either in cells in culture or in different cell-free transcription systems were investigated. The treatment of KB cells with SVE induced a rapid shutoff of host RNA synthesis. The RNA polymerase activities of SVE-treated cells were drastically depressed, corresponding, at least for RNA polymerase B, to a decrease in the number of enzyme molecules. In vitro, SVE had no direct effect on RNA polymerases but was capable of binding with calf thymus DNA to form an SVE-DNA complex modifying the template capacity. The effect of SVE on a transcription system consisting of cell lysates suggested that cytoplasmic factors are necessary for expression of the inhibitory capacity of SVE.

1400 THE DETECTION AND QUANTITATION OF SV40 NUCLEIC ACID SEQUENCES USING SINGLE-STRANDED SV40 DNA PROBES.

(Eng.) Khoury, G.; Howley, P.; Brown, M.; Martin, M. In: *Tumor Viruses. Cold Spring Harbor Symposia on Quantitative Biology*. Cold Spring Harbor Laboratory. (Cold Spring Harbor, NY): Vol. 39, pp. 219-225; 1975.

The transcription and integration of SV40 DNA has been quantified using solution hybridization and restriction enzyme techniques with separated strands of SV40 DNA. Cytoplasmic RNA from infected cells late in the lytic cycle hybridized with 46% of the minus strand and 54% of the plus strand of SV40 DNA, and RNA complementary to the plus strand was 30-50 times more abundant than that of the minus strand. This suggests the retention of specific classes of SV40 RNA within the nucleus of infected cells. The regions of the viral genome that are transcribed during the early and late phases of the lytic cycle were determined and described. The authors conclude that RNA selection occurs prior to or during transport to the cytoplasm and before the association of mRNA with the polysomes. Experiments are described that suggest that there are two copies of SV40 DNA per infected cell. Whether this represents two complete copies of the viral genome was not determined. Approximately 11%-12% of the SV40 DNA was found to be homologous to BK virus DNA.

1401 A SEDIMENTATION STUDY OF THE INTERACTION OF SUPERHELICAL SV40 DNA WITH H1 HISTONE.

(Eng.) Boettger, M. (Akademie der Wissenschaften der DDR, Zentralinstitut fuer Molekularbiologie, 1115 Berlin-Buch, Lindenberger Weg 70, E. Germany); Scherneck, S.; Fenske, H. *Nucleic Acids Res* 3(2): 419-430; 1976.

The interaction of H1 histone with superhelical circular simian virus 40 DNA was studied by moving boundary sedimentation. This interaction resulted in the formation of giant heterogenous aggregates. Aggregate size grew with increasing H1 concentrations; $s_{20,w}$ values of some 10,000 S were measured. A preferential interaction of superhelical DNA with H1 histone, as compared with open, relaxed circular DNA, was observed, regardless of the sign of the superhelical turns which was reversed by the addition to DNA of ethidium bromide. The addition of ethidium bromide to the H1 complex aggregates effected a progressive breakdown of the aggregates. Furthermore, the superhelicity of DNA was not changed by the addition of small amounts of histone. These results confirm previous indications that H1 histone exhibits a preferential interaction with circular superhelical DNA and that the extent of this interaction increases with increasing superhelicity; and furthermore, that the interaction of H1 with superhelical DNA alone and in the presence of ethidium bromide (which alters the degree of superhelicity) seems to be reversible.

1402 CHARACTERIZATION OF SV40 DNA RESCUED FROM TRANSFORMED MOUSE CELLS.

(Eng.) Botchan, M.; Ozanne, B.; Sambrook, J. In: *Tumor Viruses. Cold Spring Harbor Symposia on Quantitative Biology*. Cold Spring Harbor Laboratory. (Cold Spring Harbor, NY): Vol. 39, pp. 95-99; 1975.

The mechanism and specificity of integration of viral DNA sequences were studied by characterizing the SV40 viral DNA rescued from SVT2 cells (Balb/c mouse embryo fibroblasts transformed by SV40). The rescued viral DNA from six different clones was treated with the restrictive endonucleases Hind II and III, and the fragments were separated by gel electrophoresis. DNA from SVT2 clones 3, 4, and 5 were indistinguishable from the wild-type SV40 strain. The SVT2-0 clone DNA contained two fragments (C and F), with a 150-nucleotide pair deletion in C and a 30-unit deletion in F. The SVT2-1 clone DNA contained a 60-unit deletion in fragment C and a 30-unit deletion in F. The deletions were concurrent but not in one contiguous region of the SV40 genome. Similar results were obtained with three different cell lines (SV3T3, MSV-SV101, and LS-SV101). The virus rescued from SVT2-0 transforms Balb/c 3T3 cells 500 times more efficiently than the wild type virus. This increased transformation efficiency was not a general property of rescued SV40 viruses. The SVT2 cells had only one complete copy of the viral genome; therefore, the recovery of different viral types must have occurred by processes subsequent to initial insertion or transformation of cells with defective viral genomes. Various models for the creation of small deletions in viral DNA are discussed.

1403 SYNCHRONOUS DIGESTION OF SV40 DNA BY EXONUCLEASE III.

(Eng.) Wu, R. (Dept. Biochemistry, Molecular and Cell Biology, Cornell Univ., Ithaca, NY 14853); Ruben, G.; Siegel, B.;

Jay, E.; Spielman, P.; Tu, C. D. *Biochemistry* 15(4): 734-740; 1976.

Optimal conditions were established for the synchronous digestion of SV40 DNA (from SV40-infected confluent cultures of CV-1 or TC-7 monolayers) with *Escherichia coli* exonuclease III. With this method long sequences of nucleotides (40 to 400 nucleotides) can be removed from the 3' termini to determine sequence by subsequent labeling of the DNA molecule with radioactive nucleotides, digestion with restriction enzyme to separate the two labeled ends, and sequencing by a method such as ribo substitution. A ratio of 4 U of exonuclease III/μg SV40 DNA was sufficient to saturate all 3' ends of the DNA with enzyme. Exonuclease III digestion of DNA is synchronous at 23 or 28 C and also at 37 C, but only with purified enzyme. The exonuclease III digested at least 100 nucleotides from the same DNA terminus before attaching to another terminus. With an excess of enzyme molecules, the length of nucleotide sequences removed varied by less than 5%. The length and distribution of the digested DNA molecules were monitored by dark field electron microscopy after nuclease S_1 digestion of the DNA to remove the single-stranded tails.

1404 APPROACHES TO THE SEQUENCE DETERMINATION OF SV40 DNA. (Eng.) Fiers, W.; Danna, K.; Rogiers, R.; Vandevoorde, A.; Van Herrewefhe, J.; Van Heuverswyn, H.; Volckaert, G.; Yang, R. In: *Tumor Viruses. Cold Spring Harbor Symposia on Quantitative Biology.* Cold Spring Harbor Laboratory (Cold Spring Harbor, NY): Vol. 39, pp. 179-186; 1975.

DNA sequences of SV40 virus were determined by use of *Hemophilus influenzae* Rd restriction enzyme fragments transcribed in vitro by *Escherichia coli* RNA polymerases. These fragments, no larger than 300 base pairs, which are appropriate for further sequence studies. The transcription experiments were most extensive for fragments F, H, I, J, and K. The estimated number of nucleotides in the transcripts agrees well with the values estimated for both DNA strands by molecular weight determinations. This suggests that both strands are virtually completely transcribed, which means the approach is valid in reflecting the total genetic information. The technique allows the analysis of difficult regions, since the sequences are complementary. The advantages of the transcription approach are presented in detail. The results have confirmed that vertebrate DNA is low in CpG content, suggesting that the rare occurrences of CpG are due to unavoidable use of a particular codon or codon sequence or use as part of a specific recognition sequence. Faster and simpler techniques are needed for oligonucleotide sequencing and ordering.

1405 MUTAGENESIS UNDER THE INFLUENCE OF SIMIAN VACUOLIZING VIRUS 40 (SV40). COMMUNICATION I. INDUCTION OF CHROMOSOME ABERRATIONS IN CHINESE HAMSTER CELLS IN THE FIRST DAYS AFTER INFECTION. (Eng.) Marshak, M. I. (I. V. Kurchatov Inst. of Atomic Energy, Moscow, USSR); Massino, Y. S. *Sov Genet* 10(8): 1009-1018; 1976.

A karyological analysis was made of Chinese hamster cell chromosomes at early periods (1 to 4 days) after infection with Simian virus 40 (SV40: strain 128), in investigation of the possible generation of chromosomal aberrations. The percentage of cells in mitosis 24 hr after infection was about 9, compared to about 3% in controls. In the 24-48 hr postinfection period, 22% of all metaphases in the virus-treated cells were aberrant, compared to 8-10% in control cells. By the third day the percentage of aberrant metaphases approached the level of the control cells. The virus also induced a significant increase in the number of randomly distributed chromatid and chromosome breaks, the appearance of paired fragments of unestablished origin, and the number of gaps and coiling deficiencies. It is suggested that the chromosomal aberrations observed arise under the influence of mechanisms providing for the integration of the viral DNA into the cellular genome, but not necessarily at the sites of insertion of the viral DNA.

1406 SIMIAN VIRUS 40-CHINESE HAMSTER KIDNEY CELL INTERACTION. II. THE SEMIPERMISSIVITY OF THE CELL SYSTEM. (Eng.) Lavialle, C. (Institut de Recherches Scientifiques sur le Cancer, B. P. No. 8, 94800-Villejuif, France); Suarez, H. G.; Morris, A. G.; Estrade, S.; Stevenet, J.; Cassingena*, R. *Arch Virol* 50(1/2): 137-146; 1976.

Throughout in vitro passages, Chinese hamster kidney (CHK) cells progressively lost susceptibility to simian virus 40 (SV40) virus infection while remaining continuously susceptible to viral DNA infection. Upon infection with SV40 virus or viral DNA, the CHK cell line supported viral DNA and virus replication at a low level. SV40-transformed CHK cell lines spontaneously produced small amounts of viral DNA and virions. The percentage of virus-producing cells, as measured by the infectious center assay, was 0.002%. Various clones derived from each of these lines behaved as the parental cell population, leading to the conclusion that each CHK cell, whether transformed or not with SV40, is potentially permissive for this virus.

1407 REGULATION OF SV40-INDUCED CELL DIVISION AND TUMOR ANTIGEN BY DIBUTYRYL ADENOSINE 3'-5'-MONOPHOSPHATE. (Eng.) Robb, J. A. (Dept. Pathology, Univ. California San Diego, La Jolla, CA 92903). *J Supramol Struct* 4(2): 271(231)-278(238); 1976.

The regulatory effects of exogenous dibutyryl 3'-5' AMP (dbcAMP) on simian virus 40 (SV40)-induced cell division and tumor (T) antigen formation were investigated during abortive infection in BALB/3T3 cells and productive infection in TC7 monkey cells. SV40 induced cell division in microcultures of sparsely plated nongrowing mouse BALB/3T3 cells during acute infection at moderate multiplicities of infection [multiplicity of infection (MOI) = 10-100]. The infected cells were killed when a MOI of 1,000 was used. SV40 T antigen was synthesized in the infected cells, but viral DNA, virion antigen, and progeny virions were not synthesized (abortive infection). The addition of 0.2-1.0 mM exogenous dbcAMP at the time of infection stimulated the SV40-induced cell division at all MOI and inhibited SV40-induced cell death at high MOI. The percentage of T antigen-positive cells, as monitored by immunofluorescence, was also increased by the addition of dbcAMP (0.2-5.0 mM) at the time of infection. This regulation of SV40-induced cell division and T antigen formation by exogenous dbcAMP occurred within the first 6 hr after infection at 37 C and was dependent upon both the MOI and the concentration of added dbcAMP. The addition of dbcAMP to productively infected TC7 monkey cells had little effect on the SV40-induced cell death or T antigen formation.

1408 STUDIES ON THE RELATIONSHIP BETWEEN CONCANAVALIN A AND SV40-TRANSFORMED HUMAN FIBROBLASTS. (Eng.) Webb, T. (Medical Sch., Univ. Birmingham, Birmingham B15 2TJ, England). *Br J Cancer* 33(2): 217-225; 1976.

The extent of binding of ^{125}I-concanavalin A (^{125}I-Con A) to the surface of simian virus 40-transformed human fibroblasts and the degree of agglutination of the cells by the native lectin were measured. Trypsinized and succinylated Con A were also used to study the effects of the lectin upon certain cell growth parameters. Trypsinized Con A (10 μg/ml) was found to alter the growth rate, the saturation density, and the contact inhibition of the transformed cells, an effect not neutralized by 4.5% α-methyl-D-mannoside. These changes were not seen in normal human fibroblasts or simian virus 40-transformed mouse cells, and did not occur in the presence of succinylated Con A.

1409 COMPARATIVE CHARACTERIZATION OF TWO TYPE C ONCORNAVIRUSES ISOLATED FROM *PAPIO HAMADRYAS* WITH SIMIAN HEMOBLASTIC LEUKEMIA. (Rus.) Lapin, B. A. (Inst. Experimental Pathology and Therapy, Acad. Medical Sciences USSR, Sukhumi, USSR); D'iachenko, A. G.; Voevodin, A. F.; Kakubava, V. V.; Archaia, I. I.; Chuvirov, G. N.; Beriia, L. Ia.; Iakovleva, L. A. *Dokl Akad Nauk SSSR* 225(3): 701-703; 1975.

BILN, a type C oncornavirus isolated from the inguinal lymph node of *Papio hamadryas* with simian hemoblastic leukemia, was compared with a type C oncornavirus present in the blood of similarly affected animals. The buoyant density of both viruses was analogous, and the sedimentation constant of viral RNA was equivalent to 65-70 S for both viruses. However, GS-3 antigens were found in BILN preparations but not in preparations of the plasma virus. These data indicate that the virus found in the blood of baboons with simian hemoblastic leukemia has essential distinctions from the BILN virus. Thus, if the plasma virus is a baboon virus, it belongs to a previously unknown group of these viruses. The presence in the virus of oncogenic potentials attests to its possible etiologic role in the development of simian hemoblastic leukemia, as well as to the fact that humans may be natural hosts for this virus.

1410 PLASMINOGEN, A NECESSARY FACTOR FOR CELL MIGRATION IN VITRO. (Eng.) Ossowski, L.; Quigley, J. P.; Reich, E. In: *Proteases and Biological Control. Cold Spring Harbor Conferences on Cell Proliferation*. Cold Spring Harbor Lab. (Cold Spring Harbor, NY): Vol. 2, pp. 901-913; 1975.

The relationship between plasminogen and cell migration in culture was studied. Migration was assayed in transformed and normal cells [hamster and rat embryo fibroblasts, human osteosarcoma cells, and rat embryo fibroblasts transformed by SV40, 3T3, 3T3-SV40 (SV101), and B77] by a count of the number of cells migrating across the edge of a wound in the cell monolayer in culture. The migration of untransformed and transformed cells is reduced in plasminogen-depleted media (80% reduction for transformed cells) and partially restored (fully restored for transformed cells) when highly purified plasminogen is added to the media. Maximal migration levels can be promoted by preincubation with media containing elevated plasminogen levels, suggesting that plasminogen, plasmin, or a product of plasmin action must accumulate or persist in transformed cultures for prolonged periods. Serum factors that inhibit migration resemble known plasmin inhibitors in sensitivity to irreversible inactivation at acid pH. Reconstituted plasminogen-depleted serum restores migration only if the added plasminogen is converted to plasmin by a cellular activator. Normal cells require unidentified serum components in addition to plasminogen for optimal migration.

1411 FURTHER INVESTIGATION OF ONCORNAVIRUS LPV-INDUCED PATHOLOGICAL PROCESS IN MONKEYS. (Rus.) Andzhaparidze, O. G. (Moscow Scientific Res. Inst. Viral Preparations, USSR Ministry Public Health, Moscow, USSR); Stepanova, L. G.; Rozina, E. E.; Prianichnikova, L. V. *Vopr Virusol* (6): 666-672; 1975.

Researchers investigated the pathogenicity of LPV oncornavirus and Mason-Pfizer-like virus for 28 *Macaca mulatta* monkeys. The mixture of culture fluid and cell homogenate ultrafiltrates of the virus-producing T-9 cell line was used as a source of LPV virus. The same materials derived from the HEp-2 continuous cell line served as a source of Mason-Pfizer-like virus. Monkeys were inoculated with ultrafiltrates from human diploid cells as a control. The totality of observed histologic changes indicated that only the introduction of LPV virus into 15/16 affected animals caused damage consistent with aleukemic forms of hemoblastosis. In 3/7 monkeys that received the virus from HEp-2 cells, hyperplasia of lymphatic tissue was seen only in certain lymph nodes and in the spleen, with no changes found in bone marrow cells. Changes in some lymph nodes and the spleen, associated with isolated accompanying infections, were noted only in two control animals.

1412 EVIDENCE FOR PALINDROMIC SEQUENCES NEAR THE TERMINI OF ADENOVIRUS 2 DNA. (Eng.) Padmanabhan, R. (St. Louis Univ. Sch. Medicine, 3861 Park Ave., St. Louis, MO 63110); Padmanabhan, R.; Green, M. *Biochem Biophys Res Commun* 69(4): 860-867; 1976.

The kinetics of *Escherichia coli* exonuclease III digestion of adenovirus 2 DNA were studied by DNA polymerase I-catalyzed repair synthesis at 5 C. The results suggested the formation of a hairpin structure in the single-stranded template, exposed by endonuclease III. This structure resulted from a sequence with an inverted repetition of the type a b c d•••d' c' b' a'. These sequences were approximately 180 nucleotides from each terminus of adenovirus 2 DNA, as determined by the use of specific restriction endonucleases. The possible role of this region in the replication of the adenovirus 2 genome is discussed.

1413 DOUBLE-STRANDED DNA BINDING OF ADENOVIRUS TYPE 12 TUMOR ANTIGEN. (Eng.) Raska, K., Jr. (Rutgers Medical Sch., Piscataway, NJ 08854); Rubio, V.; Biron, K. K. *FEBS Lett* 62(2): 173-176; 1976.

The role of adenovirus type 12 (Ad12) tumor antigen (T) has been studied in an HT2 line of Ad12-induced tumor cells and in the T637 line of Ad12-transformed BHK21 cells. The T antigen was separated and purified 200 times by Sephadex G-100 column chromatography. The molecular wt determination of 80,000 agrees with that reported for the thermolabile component of T antigen in Ad12-infected KB cells. The T antigen did not bind to single-stranded DNA but had high affinity for double-stranded DNA. The antigen was shown to be distinct from the virus inhibitory factor present in both lines. The observation that T antigen binds to double-stranded DNA and the association of inhibition of T antigen synthesis with that of DNA suggest a role for T antigen in the initiation of DNA synthesis.

1414 CHANGES IN ANTIBODIES TO EPSTEIN-BARR VIRUS-ASSOCIATED ANTIGENS WITH THE DEVELOPMENT OF BURKITT'S LYMPHOMA. (Eng.) Magrath, I. T.; Henle, W. In: *Oncogenesis and Herpesviruses II. Part 2: Epidemiology, Host Response and Control. Proceedings of a Symposium held in Nuremberg, Federal Republic of Germany, 14-16 October 1974.* International Agency for Res. on Cancer (Lyon, France): pp. 275-281; 1975.

The unique case is presented of an 8-yr-old Ugandan boy in whom antibodies to Epstein-Barr virus-associated antigens were detected serially 9 mo prior to the onset of Burkitt's lymphoma. The boy originally presented with Hodgkin's disease, and at that time, antibodies to viral capsid antigen, Epstein-Barr nuclear antigen, and membrane antigen were detected. The occurrence of Burkitt's lymphoma in an already seropositive individual indicates that, if Epstein-Barr virus is causally related, either the latent period between primary infection and tumor may be at least 9 mo, or the disease results from the interaction of cofactors with lymphoid cells that harbor the viral genome.

1415 ATTEMPTS TO DEMONSTRATE VIRUS-SPECIFIC SEQUENCES IN HUMAN TUMORS; IV: EB VIRAL DNA IN EUROPEAN BURKITT LYMPHOMA AND IMMUNOBLASTIC LYMPHADENOPATHY WITH EXCESSIVE PLASMACYTOSIS. (Eng.) Bornkamm, G. W. (Institut fuer klinische Virologie der Universitaet Erlangen-Nuernberg, Loschgestr. 7, 852 Erlangen, E. Germany); Stein, H.; Lennert, K.; Rueggeberg, F.; Bartels, H.; Zur Hausen, H. *Int J Cancer* 17(2):177-181; 1976.

Biopsies from different European malignant lymphomas, two biopsies from nasopharyngeal carcinomas, and material from non-neoplastic lymph nodes were assayed for the presence of Epstein-Barr virus (EBV) DNA by nucleic acid hybridization. Reassociation kinetics of in vitro-labeled EBV DNA were studied in the presence of tumor DNA. The lymphomas tested included follicular lymphomas, germinocytomas, immunoblastic lymphomas and lymphoplasmacytoid immunocytomas. Epstein-Barr viral DNA was demonstrated within the two nasopharyngeal carcinoma biopsies, as expected. A histologically typical Burkitt lymphoma and an immunoblastic lymphadenopathy with excessive plasmacytosis also contained EBV-DNA. The Burkitt biopsy revealed about 15 EBV genome equivalents per cell. Antibodies against EBV-specific antigens were highly elevated in the serum of this patient. The material of the patient with immunoblastic lymphadenopathy contained 2-3 EBV genome equivalents per cell.

1416 EB VIRUS ANTIBODY AND INFECTIOUS MONONUCLEOSIS IN A BOARDING SCHOOL FOR BOYS. (Eng.) Hoskins, T. W. (Central Public Health Lab., Colindale Ave., Colindale, London NW9, England); Fletcher, W. B.; Blake, J. M.; Pereira, M. S.; Edwards, J. M. B. *J Clin Pathol* 29(1): 42-45; 1976.

A study of Epstein-Barr virus (EBV) antibody was undertaken in a boarding school for boys between 11 and 18 yr of age. Thirty-five percent of 800 boys had EBV antibody when first sampled, and a small number acquired antibody each year. Some of these boys had had no recorded illness during the period before the first positive sample, and some developed classic infectious mononucleosis accompanied by a positive heterophil antibody test and detection of EBV virus-specific IgM. In this group there were 13 cases of infectious mononucleosis in 4 yr.

1417 PERSISTENCE OF EPSTEIN-BARR VIRAL NUCLEAR ANTIGEN (EBNA) IN CELLS ENTERING THE EB VIRAL CYCLE. (Eng.) Ernberg, I. (Dept. Tumor Biology, Karolinska Inst., S-10401, Stockholm, Sweden); Masucci, G.; Klein, G. *Int J Cancer* 17:197-203; 1976.

Raji and BJAB cells were infected with B95-8 or P3HR-1 (Epstein-Barr) viral particles in an attempt to determine the association of EBNA (Epstein-Barr viral nuclear antigen) with the viral cycle. By double immunofluorescence techniques, EBNA was shown to be present in infected Raji cells at the beginning of the viral cycle, as evidenced by the presence of EA (early antigen) in the same cells. Similar results were obtained with infected EBV-negative BJAB cells. These results suggest that EBNA is not the product of a gene that must be turned off before the viral cycle can begin. EBNA seems to be an early gene product preceding EA synthesis. Data supporting the assumption that EBNA and EA are different gene products are discussed.

1418 CLONAL TRANSFORMATION OF HUMAN LEUKOCYTES BY EPSTEIN-BARR VIRUS IN SOFT AGAR. (Eng.) Yamamoto, N. (Kumamoto Univ. Medical Sch., Kumamoto, 860, Japan); Hinuma, Y. *Int J Cancer* 17(2): 191-196; 1976.

The B95-8 strain of Epstein-Barr virus (EBV) induced colony formation of human umbilical cord-blood WBC in soft agar medium. One-hit response relationship between the number of colonies and the virus dose was observed with high dilutions of the virus preparation. However, there was a presumed cell-killing effect with low dilutions of virus. The colonies were similarly induced, but with a lower efficiency, in adult peripheral blood WBC cultures infected with the virus. The colony-forming activity of EBV was neutralized by anti-EBV-positive but not by negative human sera. The cells in colonies were capable of continuous growth and carried EBV-associated nuclear antigen. These results indicate that the colony formation was caused by clonal transformation by EBV.

1419 DEOXYRIBONUCLEOSIDE TRIPHOSPHATE POOLS IN SYNCHRONIZED HUMAN CELLS INFECTED WITH HERPES SIMPLEX VIRUS TYPES 1 AND 2. (Eng.) Roller, B. (Sch. Dental Medicine, Univ. Pennsylvania, Philadelphia, PA 19174); Cohen, G. H. *J Virol* 18(1): 58-64; 1976.

Deoxyribonucleoside triphosphate pools in uninfected and herpes simplex virus type 1 (HSV-1) and HSV-2-infected KB cells were analyzed to determine whether ribonucleotide reductase functions in vivo in the presence and absence of thymidine (TdR). HSV-1 replication was not inhibited by TdR. Both HSV-1 and HSV-2 induced an altered ribonucleotide reductase resistant to deoxythymidine triphosphate (dTTP) inhibition. Thus, the block to HSV-2 replication apparently was not at the level of reductase. In TdR-blocked HSV-2-infected cells, while dTTP levels remained high, deoxycytidine triphosphate (dCTP) concentrations increased. In contrast, KB cells blocked by TdR showed increased dTTP but decreased dCTP levels. The authors conclude that the HSV-2 enzyme is functional in vivo and that TdR inhibits viral replication by a mechanism other than depletion of dCTP. Infection of KB cells with HSV-1 or HSV-2 altered both dATP and deoxyguanosine triphosphate (dGTP) levels in the presence or absence of TdR. Inhibition of viral replication was not explained by changes in these pools. It is suggested that, during infection, HSV-1 induces a virus function(s) not related to reductase that is resistant to TdR, whereas the corresponding HSV-2 function is sensitive. The evidence shows that the TdR-sensitive function is not in the pathways leading to deoxyribonucleoside triphosphate and may occur at the level of DNA replication.

1420 ELECTRON MICROSCOPE STUDIES OF TEMPERATURE-SENSITIVE MUTANTS OF HERPES SIMPLEX VIRUS TYPE 2. (Eng.) Cabral, G. A. (Baylor Coll. Medicine, Houston, TX 77030); Schaffer, P. A. *J Virol* 18(2): 727-737; 1976.

Nine temperature-sensitive mutants of herpes simplex virus type 2 representing eight complementation groups were assigned to two classes as a consequence of the virion forms and virus-specific cellular alterations observed in thin sections of mutant-infected human embryonic lung cells grown at the nonpermissive temperature. Mutants in class A, one DNA- and one DNA+, failed to synthesize detectable virus particles. Mutants in class B, four DNA- and three DNA+, produced moderate to large numbers of empty nucleocapsids. Dense-cored nucleocapsids were not observed in thin sections of cells infected with any of the nine mutants at this temperature. Virus-specific cellular alterations consisted primarily of margination of chromatin and nuclear membrane thickening and duplication. This study demonstrates that these mutants representing eight complementation groups differ markedly from each other and from wild-type virus with regard to the products of morphogenesis.

1421 REGULATION OF HERPESVIRUS MACROMOLECULAR SYNTHESIS: EVIDENCE FOR MULTILEVEL REGULATION OF HERPES SIMPLEX 1 RNA AND PROTEIN SYNTHESIS. (Eng.) Roizman, B.; Kozak, M.; Honess, R. W.; Hayward, G. In: *Tumor Viruses. Cold Spring Harbor Symposia on Quantitative Biology.* Cold Spring Harbor Laboratory. (Cold Spring Harbor, NY): Vol. 39, pp. 687-701; 1975.

Regulation of the synthesis of viral gene products by the infected cell was examined. Evidence indicates that the synthesis of both viral RNA and proteins is regulated at several levels; i.e., synthesis of transportable and nontransportable RNA, selective adenylation of RNA, selective transport of RNA, coordinate onset and cessation of viral polypeptide synthesis, and cascade regulation of α, β, and γ viral proteins. The properties of the F strain of human herpesvirus [HSV-1 (F)] were studied and compared with HSV-1 (mP, MP, VR3, HFEM, B4) and HSV-2 (g). Peptides from infectd cells were isolated by polyacrylamide gel electrophoresis and viral DNA from viral capsids by sucrose density gradient centrifugation. DNA-RNA hybridization determined the fraction of viral DNA transcripts in the cells.

1422 PROPERTIES OF TEMPERATURE-SENSITIVE MUTANTS OF POLYOMA VIRUS. (Eng.) Eckhart, W. In: *Tumor Viruses. Cold Springs Harbor Symposia on Quantitative Biology*. Cold Spring Harbor Laboratory. (Cold Spring Harbor, NY): Vol. 39, pp. 37-40; 1975.

The properties of various temperature-sensitive mutants of polyoma virus were characterized by studying their ability to transform BHK, 3T3, and Swiss mouse embryo cells. Two classes of mutants were detected: (1) early mutants blocked in viral DNA synthesis at the restrictive temperature, and (2) late mutants that synthesize viral DNA, but not viral particles, at the restrictive temperature. The data suggest a defect in a virion-associated protein, which prevents expression of early viral functions during lytic infection at the restrictive temperature. Results also suggest a defect in an early viral gene required for initiation of cellular DNA synthesis. It seems that at least some of the information in the late region of the genomes codes for viral particle proteins. The data have elucidated some of the functions necessary at different stages of infection and transformation.

1423 ONCORNAVIRUS BUDDING: KINETICS OF FORMATION AND UTILIZATION OF VIRAL MEMBRANE GLYCOPROTEIN. (Eng.) Witte, O. N. (Stanford Univ. Sch. Medicine, Stanford, CA 94305); Weissman, I. L. *Virology* 69(2): 464-473; 1976.

Experiments involving pulse-chase incorporation of labeled polypeptide and carbohydrate precursors into intracellular virion components isolated by immunoprecipitation were used to investigate the mechanism of the delay observed between core synthesis and the appearance of labeled major membrane glycoproteins (gp69,71) in extracellular virions. The major intracellular component precipitated by anti-gp69,71 antisera was found to be a 69,000-71,000-dalton form(s) that contained both amino acid (leucine) and carbohydrate (glucosamine) precursors. Following a 10 min pulse label with [^{3}H]leucine, these 69,000-71,000-molecular wt forms rapidly appeared and rose to their maximum intracellular specific activity within 10-20 min of chase. This maximum specific activity remained constant for 1 hr of chase. During this period little immunoprecipitable gp69,71 was released into the supernantant fluid. During later chase intervals (to 3 hr), the intracellular gp69,71-specific activity fell, while the extracellular supernatant gp68,71 rose proportionally. The authors conclude that the delay in appearance of label in extracellular gp69,71 is due to some postsynthetic process involving passage of these recently synthesized glycoproteins through one or more large intermediary pools prior to availability for the budding process. Lactoperoxidase-catalyzed pulse radioiodination of log-phase 78A1 cells followed by analysis of subsequently budded virions revealed a large pool of these glycoproteins on the cell membrane and, as well, provided evidence for a striking selection of available cell membrane proteins for inclusion in the budding site.

1424 DNA POLYMERASE ACTIVITIES INDUCED BY POLYOMA VIRUS INFECTION OF 3T3 MOUSE FIBROBLASTS. (Eng.) Narkhammar, M. (Medical Nobel Inst., Karolinska Inst., Stockholm, Sweden); Magnusson, G. *J Virol* 18(1): 1-6; 1976.

Resting mouse 3T3 fibroblasts were stimulated to synthesize DNA either by infection with polyoma virus or by injection of fresh serum. Changes in the levels of DNA α-, β-, and γ-polymerase were measured in the cytoplasm and the cell nucleus. Both types of stimulation gave similar increases for all three enzyme activities. In the cell nucleus, both α- and γ-polymerases increased almost 10-fold, whereas the β-enzyme only was stimulated 2-fold. In the cytoplasm α- and γ-polymerases increased 2- to 4-fold. Only insignificant amounts of the β-enzyme were found in the cytoplasm.

1425 THYMIDINE KINASE ISOZYMES OF NORMAL AND VIRUS-INFECTED CELLS. (Eng.) Kit, S.; Leung, W.-C.; Jorgensen, G. N.; Trkula, D.; Dubbs, D. R. In: *Tumor Viruses. Cold Spring Harbor Symposia on Quantitative Biology*. Cold Spring Harbor Lab. (Cold Spring Harbor, NY): pp. 703-715; 1975.

Thymidine kinase activity is induced in cells infected by SV40, adenovirus, vaccinia virus, HSV-1, and HSV-2, as well as by the avian herpesviruses ILTV and HVT. Induced enzyme activity is located principally in the cytosol. Adenovirus- or SV40-induced enzyme does not differ from the thymidine kinase from normal cells; however, HSV-1 and HSV-2 enzymes can be distinguished from cytosolic and mitochondrial enzymes of normal cells. The enzymes induced by the avian herpesviruses are similar to the HSV-1 and HSV-2 enzymes. Viruses were propagated in African green monkey kidney, mouse fibroblasts, chorioallantoic membrane of 10-day-old chick embryos, primary chick embryo cultures, and CV-1 and KB cells (human carcinoma of the pharynx).

1426 ARE PROTEASES INVOLVED IN ALTERING SURFACE PROTEINS DURING VIRAL TRANSFORMA-

TION? (Eng.) Hynes, R. O.; Wyke, J. A.; Bye, J. M.; Humphryes, K. C.; Pearlstein, E. S. In: *Proteases and Biological Control. Cold Spring Harbor Conferences on Cell Proliferation.* Cold Spring Harbor Lab. (Cold Spring Harbor, NY): vol. 2, pp. 931-944; 1975.

Three theories for the absence from the surfaces and purified membranes of virally transformed cells of a large, external, transformation-sensitive (LETS) glycoprotein were examined: (a) lack of synthesis, (b) continued synthesis but faulty processing, and (c) lack of retention in the membrane. The LETS protein is present in transformed cells in a latent form (an incompletely glycosylated precursor molecule or a molecule of different size and mobility on gels) that is expressed during protein synthesis inhibition or incubation at a restrictive temperature. After transformation or the addition of transformed cells to normal cells, an accelerated turnover of the LETS protein is observed, which suggests a role for proteases in altering cell surfaces after transformation. Activation of plasminogen is not required for the absence of LETS protein, but plasminogen activator or other transformation proteases may well be involved. Various cells were used; i.e., NIL8, normal hamster fibroblasts; NIL-HSV6, NIL8 cells transformed by hamster sarcoma virus; and temperature-sensitive Rous sarcoma virus mutants of chicken embryo fibroblasts from Brown Leghorn embryos. The LETS protein was identified by lactoperoxidase-catalyzed iodination and SDS-polyacrylamide gel electrophoresis.

1427 PLASMINOGEN ACTIVATOR: SECRETION BY NEOPLASTIC CELLS AND MACROPHAGES. (Eng.) Reich, E. In: *Proteases and Biological Control. Cold Spring Harbor Conferences on Cell Proliferation.* Cold Spring Harbor Lab. (Cold Spring Harbor, NY): Vol. 2, pp. 333-341; 1975.

Plasminogen activation in cell cultures with relation to oncogenic transformation and to macrophage function was studied. A method (overlays of fibrin-agar gels) was developed that is applicable to living cells and can discriminate between normal and transformed cells within 2-24 hr of incubation. The onset of plasminogen activator synthesis in macrophages is coordinated with marked changes in the pattern of serine enzyme secretion. In mouse fibroblasts transformed by mouse sarcoma virus, five new and distinct serine enzymes accumulate, four of which are proteases. An assay developed to define the inhibitor spectrum of plasminogen activator based on the incorporation of ^{3}H-diisopropylfluorophosphate showed that plasminogen activators and the associated serine enzymes are unaffected by a large number of macromolecular inhibitors. Neither plasminogen nor enhanced activation is required for maximal rates of cell growth in culture, but plasminogen activation is necessary for cell migration. Variations in plasminogen activator secretion observed in some cell lines are not detected in early passage cultures and in those cells transformed by RNA tumor viruses, suggesting that results of phenotypic studies with established cell lines should be interpreted with caution. Studies with mouse peritoneal macrophages have established: (a) production and secretion by macrophage cultures of a plasminogen activator similar to that in transformed mouse fibroblasts; (b) macrophage stimulation by ip injection of BCG, thioglycollate, mineral oil, asbestos, and *Corynebacterium parvum*; (c) appearance of a large number of serine enzymes, including plasminogen activator; (d) concanavalin A stimulation of activator production in endotoxin-primed macrophages; and (e) anti-inflammatory steroid suppression of activator secretion by stimulated macrophages.

1428 PRECIPITATING SERUM ANTIBODIES TO ONCORNAVIRUS TYPE C. (Rus.) Valikhov, A. F. (All-Union Inst. of Experimental Veterinary Science, USSR). *Veterinariia* (1): 44-46; 1976.

Serologic methods of detecting serum antibodies to oncornavirus type C have proved useful in investigating bovine leukosis. At present, immunodiffusion (ID), indirect immunofluorescence (IF), and complement fixation are used. ID in gel became widespread because it is simple to establish. Investigations with this method on 8,000 head of cattle revealed type C oncornavirus in 10% of dairy cattle and 1% of meat cattle. When indirect IF was used on 379 cattle, a dependence among the presence of type C oncornavirus, persistent lymphocytosis, and bovine leukosis was found. In its sensitivity, the ID reaction corresponds to complement fixation in manifesting virus-specific antibodies in the serum of cattle with leukosis. Serologic investigation of cattle showed that 30/35 (86 (86%) animals with histologically confirmed spontaneous leukosis, 131/189 (69%) cattle with hematologically suspected leukosis, and 5/211 healthy animals had precipitating antibodies to virus-specific antigens.

1429 POLYPEPTIDE COMPONENTS OF WOUND TUMOR VIRUS. (Eng.) Reddy, D. V. R. (Provisional Dept. Genetics and Development, Univ. Illinois, Urbana, IL 61801); MacLeod, R. *Virology* 70(2): 274-282; 1976.

1430 DISTRIBUTION OF ENVELOPE-SPECIFIC AND SARCOMA-SPECIFIC NUCLEOTIDE SEQUENCES FROM DIFFERENT PARENTS IN THE RNAs OF AVIAN TUMOR VIRUS RECOMBINANTS. (Eng.) Wang, L.-H. (Dept. Molecular Biology and Virus Lab., Univ. California, Berkeley, CA 94720); Duesberg, P.; Mellon, P.; Vogt, P. K. *Proc Natl Acad Sci USA* 73(4): 1073-1077; 1976.

1431 ROLE OF THE SUBUNITS OF THE AVIAN RNA TUMOR VIRUS REVERSE TRANSCRIPTASE. (Eng.) Panet, A.; Verma, I. M.; Baltimore, D. In: *Tumor Viruses. Cold Spring Harbor Symposia on Quantitative Biology.* Cold Spring Harbor Lab.

(Cold Spring Harbor, NY); vol. 39, pp. 919-923; 1975.

1432 PROPERTIES AND KINETICS OF DEVELOPMENT OF ROUS SARCOMA VIRUS-INFECTED CELLS EVIDENCED BY METHYLENE BLUE STAINING. (Eng.) Barlati, S. (Laboratorio di Genetica Biochimica ed Evoluzionistica del CNR, I-27100 Pavia, Italy); Mignatti, P.; Kryceve, C.; Vigier, P. *Intervirology* 6(1): 25-31; 1975/76.

1433 THE FINE STRUCTURE OF INTRACRANIAL NEOPLASMS INDUCED BY THE INOCULATION OF AVIAN SARCOMA VIRUS IN NEONATAL AND ADULT RATS. (Eng.) Copeland, D. D. (Natl. Inst. Environmental Health Sciences, Res. Triangle Park, NC 27709); Talley, F. A.; Bigner, D. D. *Am J Pathol* 83(1): 149-166; 1976.

1434 CELL CULTURE OF PERIPHERAL LEUKOCYTES FROM CHICKS INFECTED WITH JM-V HERPESVIRUS (Abstract). (Eng.) Hahn, E. C. (Memorial Sloan-Kettering Cancer Center, New York, NY 10021); Ramos, L.; Kenyon, A. J. *In Vitro* 12(4): 289; 1976.

1435 HORMONAL MEDICATED TRANSFORMATION ENHANCEMENT OF HUMAN CELLS BY FELINE SARCOMA VIRUS (Abstract). (Eng.) Schaller, J. P. (Ohio State Univ., Columbus, OH 43210); Milo, G. E.; Blakeslee, J. R.; Yohn, D. S.; Olsen, R. G. *In Vitro* 12(4): 318-319; 1976.

1436 THE OVERT/COVERT NATURE OF FELINE SYNCYTIUM-FORMING VIRUS REPLICATION IN THE NATURAL HOST AND IN CELL CULTURE (Abstract). (Eng.) Whitman, J. E., Jr. (Hem Res., Inc., Rockville, MD 20852); Gilmore, C. E.; Hall, W. T. *In Vitro* 12(4): 290; 1976.

1437 MORPHOGENESIS OF BOVINE PARVOVIRUS DURING REPLICATION IN SYNCHRONIZED CELLS (Abstract). (Eng.) Bates, R. C. (Virginia Polytechnic Inst. and State Univ., Blacksburg, VA 24061); Stetler, D. A.; Parris, D. S. *In Vitro* 12(4): 290-291; 1976.

1438 MOLONEY SARCOMA VIRUS (MSV)-INDUCED OSTEOSARCOMA IN THE RAT: ULTRASTRUCTURAL AND HISTOPATHOLOGIC STUDIES (Abstract). (Eng.) Olsen, H. M. (Coll. Veterinary Medicine, Ohio State Univ., Columbus, OH 43210); Capen, C. C. *Lab Invest* 34(3): 328-329; 1976.

1439 IN VITRO CORRELATION BETWEEN VIRUS PRODUCTION AND CELL PROLIFERATION OF RAT LYMPHOMAS (Abstract). (Eng.) Wuu, K. D. (Sch. Veterinary Medicine, Univ. Pennsylvania, New Bolton Center, Kennett Square, PA 19348); Ferrer, J. F. *In Vitro* 12(4): 318; 1976.

1440 CONSTITUTIVE HETEROCHROMATIN SISTER CHROMATID EXCHANGES, VIRUSES AND TRANSFORMED CELL CULTURES (Abstract). (Eng.) Earley, E. M. (Bureau Biologics, FDA, Bethesda, MD 20014); Petricciani, J. C. *In Vitro* 12(4): 326; 1976.

1441 STUDY ON THE MECHANISM OF INTERFERENCE BETWEEN FRIEND LEUKEMIA AND SINDBIS VIRUSES IN TISSUE CULTURE. (Eng.) Pogodina, V. V. (Inst. Poliomyelitis and Virus Encephalitis, Acad. Medical Sciences, Moscow, USSR); Senyuta, N. B.; Karmysheva, V. Ya.; Korolev, M. B.; Satalkina, M. I.; Kiseleva, L. L.; Merekalova, Z. I.; Mazurenko, N. P. *Neoplasia* 23(1): 61-70; 1976.

1442 STUDY OF CELL DEATH IN FRIEND LEUKAEMIA. (Eng.) Smadja-Joffe, F. (Institut de Cancerologie et d'Immunogenetique, Hopital Paul-Brousse, 14-16 avenue Paul-Vaillant-Couturier, 94800 Villejuif, France); Klein, B.; Kerdiles, C.; Feinendegen, L.; Jasmin, C. *Cell Tissue Kinet* 9(2): 131-145; 1976.

1443 XENOTROPIC NZB MOUSE LEUKEMIA VIRUS (X-NZB-MLV) MIMICS HELPER VIRUS ROLE FOR POLYCYTHEMIC FRIEND VIRUS (PFV) IN FORMING ERYTHROBLAST FOCI IN SPLEEN (Abstract). (Eng.) Fjelde, A. (Roswell Park Memorial Inst., Buffalo, NY 14263); Evege, E.; Oleszek, D. *In Vitro* 12(4): 317; 1976.

1444 RETRANSFORMATION OF A THERMOSENSITIVE BALB/C-3T3 TRANSFORMANT BY MURINE SARCOMA VIRUS AT THE NON-PERMISSIVE TEMPERATURE (Abstract). (Eng.) Kamely, D. (Imperial Cancer Res. Fund, Lincoln's Inn Fields, London WC2A 3PX, England). *In Vitro* 12(4): 317; 1976.

1445 FACTORS INFLUENCING SYNTHESIS OF MOUSE MAMMARY TUMOR VIRUS BY CELLS GROWN IN CHEMICALLY-DEFINED MEDIUM (Abstract). (Eng.) Nagle, S. C. (NCI Frederick Cancer Res. Center, P.O. Box B, Frederick, MD 21701). *In Vitro* 12(4): 316; 1976.

1446 OPTIMIZATION OF DEXAMETHASONE-STIMULATED MM5MT/C_1 CELLS FOR EXPRESSION AND RECOVERY OF MOUSE MAMMARY TUMOR VIRUS WITH HIGH RDDP ACTIVITY (Abstract). (Eng.) Brown, B. L. (NCI Frederick Cancer Res. Center, P.O. Box B, Frederick, MD 21701); Orme, L. A.; Bauer, R. F.; Fine, D. L. *In Vitro* 12(4): 316; 1976.

1447 CELL TRANSFORMATION AND MOUSE MAMMARY TUMOR VIRUS (Abstract). (Eng.) Lasfargues, E. Y. (Robinson Inst. Medical Res., Camden, NJ 08103); Lasfargues, J. C.; Robinson, C. S. *In Vitro* 12(4): 316-317; 1976.

1448 STIMULATION OF MOUSE MAMMARY TUMOR VIRUS REPLICATION BY ESTRADIOL-17B (Abstract). (Eng.) Young, L. J. T. (Sch. Medicine, Univ. California, Davis, CA 95616); Cardiff, R. D.; Pratt, T. S. *In Vitro* 12(4): 315; 1976.

1449 SECRETION AND REGULATION OF PLASMINOGEN ACTIVATOR IN MACROPHAGES. (Eng.) Unkeless, J. C.; Gordon, S. In: *Proteases and Biological Control. Cold Spring Harbor Conferences on Cell Proliferation.* Cold Spring Harbor Lab. (Cold Spring Harbor, NY): vol. 2, pp. 495-514; 1975.

1450 GEL CHROMATOGRAPHY OF SERUM FROM MICE INFECTED WITH A VIRUS ELEVATING L-LACTATE: NAD OXIDOREDUCTASE ACTIVITY--AN ATTEMPT TO SEPARATE VIRAL AND ENZYMATIC ACTIVITIES. (Eng.) Motycka, K. (Inst. Haematology and Blood Transfusion, 12600 Prague, Czechoslovakia); Jandova, A.; Krivakova, M.; Coupek, J.; Pezlarova, J. *Acta Virol* 20(1): 53-60; 1976.

1451 DIMETHYL SULFOXIDE INDUCTION OF R-TYPE VIRUS-LIKE PARTICLES IN A SV-40 INDUCED HAMSTER TUMOR CELL LINE (Abstract). (Eng.) Bergmann, D. G. (Ohio State Univ., Columbus, OH 43210); Wolff, D. A. *In Vitro* 12(4): 291; 1976.

1452 ESTABLISHMENT OF OWL MONKEY KIDNEY-210-CELL LINE FOR VIROLOGICAL STUDIES (Abstract). (Eng.) Daniel, M. D. (Harvard Medical Sch., Southborough, MA 01772); Silva, D.; Ma, N. *In Vitro* 12(4): 290; 1976.

1453 VIRAL TRANSFORMATION OF HUMAN CELLS AND EXPRESSION OF THEIR TUMORIGENIC PHENOTYPE (Abstract). (Eng.) Steplewski, Z. (Wistar Inst., Philadelphia, PA 19104); Koprowski, H.; Croce, C. M. *In Vitro* 12(4): 283; 1976.

1454 NONHISTONE NUCLEAR PROTEINS CHARACTERISTIC OF G_0 TO G_1 TRANSITION (Abstract). (Eng.) Cholan, J. J. (Coll. Medicine and Dentistry New Jersey, Newark, NJ 07103); Studzinski, G. P. *In Vitro* 12(4): 296; 1976.

1455 EFFECT OF POTASSIUM DEPLETION ON RNA METABOLISM IN CULTURED MAMMALIAN CELLS (Abstract). (Eng.) Pollack, M. (Biophysics Lab., Univ. Rhode Island, Kingston, RI 02881); Fisher, H. W. *In Vitro* 12(4): 312; 1976.

1456 DECAPSIDATION OF POLYOMA VIRUS MUTANTS. (Eng.) Frost, E. (Dept. Microbiologie, Centre Hospitalier Universitaire, Univ. Sherbrooke, Sherbrooke, Quebec, Canada J1H 5N4J); Bourgaux-Ramoisy, D.; Bourgaux, P. *Virology* 68(1): 256-259; 1975.

1457 ESTIMATION BY REASSOCIATION ASSAY OF VIRAL DNA COPIES IN THREE POLYOMA VIRUS TRANSFORMED CELL LINES. (Eng.) Reinke, C. (Institut fuer Virologie, P.O.B. 820, D-7800 Freiburg, W. Germany); Brandner, G. *Z Naturforsch [B]* 31(3/4): 212-213; 1976.

1458 THREE NEW VIRUS-SPECIFIC LOW MOLECULAR WEIGHT RNAs IN ADENOVIRUS TYPE 2 INFECTED KB CELLS. (Eng.) Raska, K., Jr. (Rutgers Medical Sch., Piscataway, NJ 08854); Sehulster, L. M.; Varricchio, F. *Biochem Biophys Res Commun* 69(1): 79-84; 1976.

1459 SEQUENCE OF EPSTEIN-BARR VIRUS PRODUCTIVE CYCLE IN HUMAN LYMPHOBLASTOID CELLS. (Eng.) Hampar, B.; Derge, J. G.; Tanaka, A.; Nonoyama, M. In: *Tumor Viruses. Cold Spring Harbor Symposia on Quantitative Biology.* Cold Spring Harbor Lab. (Cold Spring Harbor, NY): vol. 39, pp. 811-815; 1975.

1460 COMPARISONS OF LYMPHOID CELL LINES ESTABLISHED FROM INDIVIDUAL TUMORS OF A COTTON-TOPPED MARMOSET WITH MULTIPLE EPSTEIN-BARR VIRUS-INDUCED LYMPHOMAS (Abstract). (Eng.) Rabin, H. (Litton Bionetics, Inc., Kensington, MD 20795); Levy, B.; Neubauer, R. H.; Lebowitz, H.; Hopkins, R. F., III; Wallen, W. C. *In Vitro* 12(4): 288-289; 1976.

1461 HOST CELL REACTIVATION IN MAMMALIAN CELLS. V. PHOTOREACTIVATION STUDIES WITH HERPES VIRUS IN MARSUPIAL AND HUMAN CELLS. (Eng.) Lytle, C. D. (Div. Biological Effects, Dept. Health, Education and Welfare, Rockville, MD 20852); Benane, S. G.; Stafford, J. E. *Photochem Photobiol* 23(5): 331-336; 1976.

1462 NORMAL AND VIRUS-TRANSFORMED HUMAN CELL: TRANSAMIDASE SYSTEM (Abstract). (Eng.) Birckbichler, P. J. (Samuel Roberts Noble Foundation, Inc., Ardmore, OK 73401); Orr, G. R.; Conway, E.; Carter, H. A.; Patterson, M. K., Jr. *In Vitro* 12(4): 314-315; 1976.

1463 SPECIFICITY OF IMMUNE LYMPHOCYTES FOR IN VITRO DETECTION OF VIRAL INDUCED TUMOR ASSOCIATED ANTIGEN(S) (Abstract). (Eng.) Harris, L. F. (Northwestern Hosp., Minneapolis, MN 55407); Hamparian, V. V.; Young, E. A.; Hughes, J. H.; Cramblett, H. G. *In Vitro* 12(4): 292; 1976.

1464 GENERATION OF HSV ANGELOTTI VIRONS CONTAINING HIGHLY DEFECTIVE VIRAL DNA (Abstract). (Eng.) Schroeder, C. H. (Deutsches Krebsforschungszentrum, Institut fuer Virusforschung, 69 Heidelberg 1, Im Neuenheimer Feld 280, W. Germany); Stegmann, B.; Lauppe, H. F.; Kaerner, H. C. *In Vitro* 12(4): 289-290; 1976.

1465 EFFECTS OF THE INOCULATION OF CANCERVIRUS (CV) TO *MESOCRICETUS AURATUS*. (Eng.) Alvarez-Noves, J. (Dept. Biology and Biochemistry Cancer, Inst. Nacional de Oncologia, Ciudad Univ., Madrid, 3, Spain); Alvarez, Y.; Valladares, Y. *Rev Esp Oncologia* 20: 31-44; 1973.

1466 CULTIVATION OF MONOCYTOID CELLS FROM LEUKEMIC GUINEA PIG PERIPHERAL BLOOD CARRYING HERPESVIRUS GENOME (Abstract). (Eng.)

Gonzalez-Serva, A. (Yale Univ. Sch. Medicine, New Haven, CT 06516); Michalski, F. J.; Fong, C. K. Y.; Hsiung, G. D. *In Vitro* 12(4): 289; 1976.

1467 ELECTRON MICROSCOPY OF C-PARTICLES AND SMALL VESICLES IN A TRANSPLANTABLE RAT ASCITES HEPATOMA-66F. (Eng.) Takusagawa, K. (Res. Inst. Tuberculosis, Leprosy, Cancer, Tohoku Univ., Hirose-machi 4-12, Sendai 980, Japan); Ariji, F.; Sato, T.; Konno, K. *Gann* 67(1): 111-113; 1976.

1468 STUDIES ON THE PRESENCE OF VIRAL ANTIBODIES IN PATIENTS WITH VARIOUS FORMS OF MALIGNANT NEOPLASIA. (Eng.) Stoian, M. (Stefan S. Nicolau Inst. Virology, 285, Sos. Mihai Bravu, Bucharest, Romania); Hozoc, M.; Ionescu, T.; Lungu, M.; Predescu, E.; Nastac, E. *Rev Roum Med* 26(1): 125-136; 1975.

1469 INVESTIGATION OF ONCORNAVIRUS OF CONTINUOUS J-96 CELLS. (Rus.) Solov'ev, V. D. (Central Inst. for Postgraduate Training of Physicians, USSR Ministry Public Health, Moscow, USSR); Bektemirov, T. A.; Kitsak, V. Ia.; Etkind, G. V. *Vopr Virusol* (6): 672-677; 1975.

1470 THE ROLE OF CELL SURFACE CHANGES IN RNA TUMOR VIRUS-TRANSFORMED CELLS. (Eng.) Bauer, H.; Kurth, R.; Rohrschneider, L.; Pauli, G.; Friis, R. R.; Gelderblom, H. In: *Tumor Viruses. Cold Spring Harbor Symposia on Quantitative Biology*. Cold Spring Harbor Lab. (Cold Spring Harbor, NY): vol. 39, pp. 1181-1185; 1975.

See also:

* (Rev): 1208, 1211, 1212, 1218, 1219, 1220, 1221, 1222, 1223, 1224, 1225, 1226, 1227, 1228, 1229, 1230, 1256, 1266
* (Immun): 1475, 1478, 1487, 1488, 1551
* (Path): 1581, 1615
* (Epid-Biom): 1683

1471 IMMUNOGENICITY OF A RAT LEUKAEMIA OF SPONTANEOUS ORIGIN (SAL). (Eng.) Wrathmell, A. B. (Chester Beatty Res. Inst., Clifton Ave., Belmont, Sutton, Surrey, England); Alexander, P. *Br J Cancer* 33(2): 181-186; 1976.

The SAL rat leukemia, which resembles acute myeloblastic leukemia, appeared initially to be nonimmunogenic because resistance to an ip challenge with as few as 100 cells in August rats could not be obtained using stimulation of the reticuloendothelial system or by immunization with SAL cells exposed to x-rays, nitrogen mustard (10 μg/10^7 cells/ml), iodoacetate (0.001 M), or glutaraldehyde (0.25%). However, immunization with SAL cells exposed to low doses of mitomycin C (0.5 μg/10^6 cells/ml) slowed the growth of the challenge inoculum. Cells treated with high doses of mitomycin C (50 μg/10^8 cells/ml) did not immunize. The results are interpreted in terms of rapid shedding of a tumor-specific antigen from the membrane of SAL cells.

1472 LEUKEMIA ALLOTRANSPLANTS IN CANINE FETUSES: INFLUENCE OF HOST AGE AND IMMUNE RESPONSIVENESS (39198). (Eng.) Shifrine, M. (Sch. Veterinary Medicine, Univ. California, Davis, CA 95616); Bryant, B. J. *Proc Soc Exp Biol Med* 151(2): 307-309; 1976.

Myelomonocytic leukemia cells were allografted prenatally in beagle fetuses on days 43, 46, 50, and 53 of gestation and on the first postnatal day. In these groups, 8 of 8, 2 of 3, 8 of 12, 1 of 4, and 0 of 4 pups, respectively, developed tumors postnatally. These results indicate a correlation between fetal host age at the time of grafting and tumorigenesis. The leukemogenic transplants may have grown because of fetal immunoinsufficiency or because they were tolerogenic in the developing immune system. Limited immunologic data for exclusion of the latter possibility are reported.

1473 HETEROTRANSPLANTATION OF HUMAN MALIGNANT MELANOMAS TO THE MOUSE MUTANT NUDE. (Eng.) Povlsen, C. O. (Pathological Anatomical Inst., Kommunehospitalet, Copenhagen, Denmark). *Acta Pathol Microbiol Scand* 84(A): 9-16; 1976.

In 32 experiments in which human malignant melanomas were transplanted to BALB/c nude mice, tumors developed in 14 instances. The tumor tissue that grew after inoculation was derived from malignant melanoma metastases of the skin (10 takes from 13 transplantations), and from primary malignant melanomas of the eye (four takes from six transplantations). None of 13 attempts to transplant primary tumors of the skin was successful. In seven instances serial transfers of transplanted tumor were successful, the degree of success ranging from 3-41 passages. The transplanted tumors grow locally. Neither lymph node metastases nor organ metastases were observed. Histological appearances of the transplanted tumors, also after serial passages, was identical to that of the original human donor material. The human tumor/nude mouse system is compared with other heterotransplantation models.

1474 INTERFERENCE BY CORTISONE WITH ENDOTOXIN'S ADJUVATOR ACTION ON TRANSPLANTATION OF A MOUSE TUMOUR. (Eng.) Henderson, J. S. (Faculty of Medicine, Univ. Manitoba, Winnipeg R3E 0W3, Canada); Migliore, R. D.; Berbrayer, D. *Br J Cancer* 33(2): 203-209; 1976.

Observations on the in vivo plating of mouse mammary tumor were extended by making counts of tumors at a significantly earlier phase of development than in previously reported work. In the present experiments, most of the growth of the tumors was without benefit of stroma. The persistence of endotoxin's adjuvator effect on such tumor counts was tested by using either gamma irradiation or cortisone. Cortisone (0.3 g/kg, ip, on four successive days) offset endotoxin's adjuvator action; irradiation (650 rads) did not. Antagonism between endotoxin and cortisone in this system seems to indicate that endotoxin's enhancing effect depends more on inflammatory than on immunological factors.

1475 SQUAMOUS CELL CARCINOMA OF THE SKIN AND LIP IN RENAL HOMOGRAFT RECIPIENTS. (Eng.) Mullen, D. L. (Veterans Admin. Hosp., 1055 Clermont St., Denver, CO 80220); Silverberg, S. G.; Penn, I.; Hammond, W. S. *Cancer* 37(2): 729-734; 1976.

A study was undertaken to determine if squamous cell carcinomas (SCCs) of the skin and lip in renal transplant recipients have any histologic features distinguishing them from such tumors in nontransplant patients. Forty-four SCCs of the skin and lip were observed in 9 of 464 renal homograft recipients. Clinically and histologically the SCCs fell into two groups. Two patients with widespread warts, suggestive of epidermodysplasia verruciformis, showed multiple SCCs (predominantly on the upper extremities) that were associated with minimal solar elastosis of the adjacent dermis. The other seven patients did not have widespread warts; their SCCs occurred predominantly on the head and neck and were associated with prominent solar elastosis of the adjacent dermis. The degree of solar elastosis was particularly striking in view of the young age of this group (mean age, 37 yr). Inflammatory cellular response to the transplant SCCs was significantly diminished in comparison with a group of control SCCs from 44 nonimmunosuppressed patients.

1476 IMMUNOCOMPETENCE AND LUNG CANCER: UCLA UPDATE. (Eng.) Holmes, E. C. (Univ. California Los Angeles, Los Angeles, CA). *UCLA Cancer Cent Bull* 3(4): 6; 1976.

Based on dinitrochlorobenzene (DNCB) skin tests, recall antigen skin testing, and in vitro blastogenesis studies, it was found that lung cancer patients are often DNCB negative but reactive to recall antigens. This suggests that there is a defect in the afferent limb of their immune system. The magnitude of the defect is related to the tumor burden, with almost all the unresectable patients being DNCB negative at the time of surgery. Immunosuppressive substances have been found in the plasma of lung cancer patients as well as those with other neoplasms and, since lung cancers are so active, the effect of this immunosuppressive substance may be elaborated. Many DNCB negative patients become DNCB positive following removal of their tumors, which suggests that their immunological competence has been restored.

1477 GLOMERULAR INJURY IN PATIENTS WITH NEOPLASIA. (Eng.) Kaplan, B. S. (Montreal Children's Hosp., McGill Univ., Montreal, Quebec, Canada); Klassen, J.; Gault, M. H. *Annu Rev Med* 27: 117-125; 1976.

The most common form of glomerulopathy reported in patients with carcinoma has been membranous glomerulonephritis. However, increased mesangial cells and matrix have also been found in some patients with hematuria and progressive renal failure. In contrast, most patients with Hodgkin's disease and glomerulopathy have had the minimal lesion-type nephrotic syndrome, which has usually responded to successful treatment of the Hodgkin's disease. Glomerular abnormalities have also been reported with chronic lymphocytic leukemia, lymphosarcoma, Waldenstrom's macroglobulinemia, and benign tumors. When there is no apparent cause, proteinuria with or without hematuria or impaired renal function suggests the possibility of associated neoplasia, particularly in elderly patients.

1478 LEUKEMIA--AN IMMUNE DEFICIENCY? (Eng.) Barnes, R. D. In: *Advances in the Biosciences 12. Schering Symposium on Immunopathology, Cavtat, Yugoslavia, May 28 to June 1, 1973.* International Committee of Immunopathology/World Health Organization. (Pergamon Press): pp. 160- 168; 1974.

To determine whether leukemia reflects an immune deficiency in mice, the ova of AKR mice, which are susceptible to virus-induced lymphomas, and the ova of tumor-resistant CBA mice were fused and transplanted to pseudopregnant recipients. The fusion resulted in tetraparental chimeras possessing cells from both strains. Lymphomas were detected in only 6 of 18 chimeras; none were found in the remaining 12. It was determined that the lack of tumors was not due to the lack of lymphoma-prone AKR cells nor to the lack of an oncogenic virus. Fusion to CBA altered the normal host-virus relationship to AKR. The absence of tumors may be the result of active oncogenomic repression of the virus. Alternatively, if oncogenomic expression of the virus is maintained, tumors develop but they are then actively suppressed. The incidence of lymphomas in F1 mice is similar to that in the chimeras. The mechanism by which this immunity is transferred is unknown.

1479 EFFECTS OF *TRYPANOSOMA BRUCEI GAMBIENSE* INFECTIONS IN *MICROTUS MONTANUS* ON SUSCEPTIBILITY TO EHRLICH'S TUMORS. (Eng.) Ackerman, S. B. (Dept. Zoology, Univ. Georgia, Athens, GA 30602); Seed, J. R. *Infect Immun* 13(2): 388-391; 1976.

The effect of *Trypanosoma brucei gambiense* infections on the immune resistance of the field vole *Microtonus montanus* to Ehrlich's tumor growth was studied. Whereas uninfected voles were totally resistant to ip Ehrlich's ascites tumor cells challenge, over 78% of the animals infected with the trypanosomes developed tumors after challenge. Likewise, when Ehrlich's ascites cells were injected sc to induce solid tumor formation, only 7% of uninfected controls developed tumors, whereas over 82% of trypanosome-infected animals exhibited malignancies after Ehrlich's cell challenge. When solid tumors grown in albino CD-1 mice were implanted sc into uninfected voles, the tumor mass rapidly diminished in size and could not be found when animals were examined 2 wk postimplant. However, in trypanosome-infected voles, implanted tumors exhibited pronounced expansion, and viable, solid tumors were recovered from over 70% of the challenged voles at 2 wk postimplant. The results suggest that, due to the immunosuppressive effects of trypanosomiasis, *Microtus* becomes highly susceptible to tumor growth.

1480 AN INHIBITOR OF MACROPHAGE CHEMOTAXIS PRODUCED BY NEOPLASMS. (Eng.) Snyderman, R. (Duke Univ. Medical Center, Box 3892, Durham, NC 27710); Pike, M. C. *Science* 192(4237): 370-372; 1976.

The implantation of syngeneic neoplasms in mice depressed the animal's ability to localize macrophages at inflammatory sites. A low mol wt (6,000 to 10,000) factor released by growing neoplasms that inhibits the accumulation of macrophages in vivo and chemotactic responsiveness in vitro was identified. The factor is active in the inhibition of macrophages and is ineffectual at retarding the migration of polymorphonuclear leukocytes. This inhibition is as successful as that produced by a growing tumor, but it tends to be more transient. Neoplastic cells may thus abrogate immunosurveillance by releasing products that prevent potentially tumoricidal macrophages from accumulating at sites of developing malignancies.

1481 IMMUNODEFICIENCY SECONDARY TO NUTRITIONAL DEPRIVATION: CLINICAL AND LABORATORY OBSERVATIONS. (Eng.) Good, R. A.; Jose, D. In: *Immunodeficiency in Man and Animals.* Edited by D. Bergsma; R. A. Good; J. Finstad. (Sunderland, MA: Sinauer Associates, Inc.): 219-222; 1975.

The effects of protein, protein-caloric, and essential amino acid deficiency on immune response were studied in mice infected with various types of tumors. The results of all three types of deficiencies were similar: that is, acute deficiency depressed humoral immunities but not cell-mediated responses; moderate deficiency depressed primary, secondary, and tertiary antibody responses but not T-cell immunities; and severe deficiency depressed both types of immunity. The effects of the severe deficiency lasted several weeks after its cessation. Similar results were observed in children with nutritional deficiencies from various parts of the world, and these are discussed at length. The results of preliminary experiments in which the decline in cell-mediated immunity and the expression of autoimmune disease are forestalled by manipulation of the diet are discussed. These studies may help in the design of diets to ward off diseases associated with aging.

1482 EFFECTS OF NEOPLASMS ON INFLAMMATION: DEPRESSION OF MACROPHAGE ACCUMULATION AFTER TUMOR IMPLANTATION.

(Eng.) Snyderman, R. (Duke Univ. Medical Center, Durham, NC 27710); Pike, M. C.; Blaylock, B. L.; Weinstein, P. *J Immunol* 116(3): 585-589; 1976.

To determine the effect of neoplasms on macrophage migration, C3H/HeJ mice were implanted sc with either sarcoma or hepatoma cells, and their macrophage migratory function was quantified in vivo and in vitro. The ability of tumor-bearing animals to mobilize macrophages to an inflammatory site in vivo was depressed by as much as 61% 6 days after tumor implantation. The in vitro chemotactic responsiveness of macrophages recovered from the peritoneal cavities of tumor-bearing animals was also markedly depressed. Macrophage migration was not affected by implantation of normal syngeneic or allogeneic tissues. In addition, the accumulation of polymorphonuclear leukocytes in vivo was not depressed in tumor-bearing animals. These findings suggest that neoplasms themselves may depress the host's ability to localize macrophages at inflammatory sites in vivo and thereby hinder immunologically mediated tumor destruction.

1483 SUPPRESSOR CELLS IN THE SPLEENS OF TUMOR-BEARING MICE: ENRICHMENT BY CENTRIFUGATION ON HYPAQUE-FICOLL AND CHARACTERIZATION OF THE SUPPRESSOR POPULATION.

(Eng.) Pope, B. L. (Dept. Microbiology, Univ. British Columbia, Vancouver, British Columbia, V6T 1W5, Canada); Whitney, R. B.; Levy, J. G.; Kilburn, D. G. *J Immunol* 116(5): 1342-1346; 1976.

Spleen cells from DBA/2J mice bearing methylcholantyhrene-induced sarcomas or a mammary adenocarcinoma suppressed the mitogen responses of normal spleen and lymph node cells. Lymph node cells from tumor bearers had no suppressive effects. Centrifugation of spleen cells layered on Hypaque-Ficoll (specific gravity 1.08) produced a dense fraction that pelleted and a light fraction that was retained at the Hypaque-Ficoll-medium interface. Suppressive activity was not found in either fraction of normal spleen cells. In tumor-bearer spleen cells suppressor activity was greatly enriched in the light fraction. Treatment of the suppressor fraction with anti-θ or anti-Ig serum and complement did not remove suppressor activity. However, the suppressor cells were removed by passage through nylon wool or by carbonyl iron treatment. Also, the population that adhered to plastic Petri dishes contained the suppressor cell activity.

1484 EXPERIMENTAL STIMULATION OF CELL-MEDIATED IMMUNITY WITHOUT CONCOMITANT STIMULATION OF HUMORAL IMMUNITY IN GRAFT-VERSUS-HOST IMMUNOSUPPRESSED MICE.

(Eng.) Treiber, W. (Dept. Physiology, McGill Univ., Montreal, Canada); Lapp, W. S. *Transplantation* 21(5): 391-398; 1976.

The immunosuppressive effect of the graft-versus-host (GVH) reaction was studied in CBA x A F_1 (CAF_1) mice that had been rendered immunologically unresponsive by the iv injection of parental A strain lymphoid cells (GVH mice). Suppression of both cell-mediated and humoral immune responses was demonstrated by the prolonged survival of C57BL/6 (B6) skin allografts and by the inability of GVH mice to produce detectable antibody following stimulation with SRBC. Appropriate stimulation of GVH mice induced cell-mediated immune reactions to xeno- and allogeneic antigens, while the humoral immune responses to the same antigens remained suppressed. Multiple challenges of the GVH mice with B6 tissue caused a rapid rejection of subsequent B6 skin grafts but failed to stimulate the production of any detectable antibodies to B6 allotransplantation antigens. Sensitization of GVH mice with SRBC in Freund's complete adjuvant stimulated a delayed hypersensitivity response to SRBC, although no humoral response to SRBC could be detected, even after three challenges with SRBC. The results are discussed in terms of a proposed model for GVH-induced immunosuppression.

1485 THE EFFECTS OF PROTEIN DEPRIVATION ON CELL-MEDIATED IMMUNITY.

(Eng.) Cooper, W. C.; Mariani, T. N.; Good, R. A. In: *Immunodeficiency in Man and Animals*. Edited by D. Bergsma; R. A. Good; J. Finstad. (Sunderland, MA: Sinauer Associates, Inc.): 223-228; 1975.

Protein deficiency was shown to enhance various aspects of cell-mediated immunity in C3H and SEC/ReJ inbred mice. Four parameters of cell-mediated immunity were tested. The results were: a) spleen cells from deficient mice showed dramatically increased phytohemagglutinin responses and produced splenomegaly to a greater degree than did cells from control animals, b) deficient animals rejected abdominal allografts faster, c) macrophage activity from deficient animals was increased significantly over control activities, and d) the deficient mice were much more resistant to viral infection. Further, thymectomy in deficient mice increased the allograft survival time to normal values. The principal effector cells of cell-mediated immunity are thymic-dependent lymphoid cells. Based on these results, it is concluded that the cellular effector mechanism is enhanced by protein deficiency, but it cannot be determined whether a) each effector cell is made more immunocompetent or b) the absolute population of effector cells is increased.

1486 IN VITRO CYTOTOXICITY STUDIES IN BLADDER AND RENAL CELL CANCER. (Eng.) Elhilali, M. M. (Urology Dept., Sherbrooke Univ., Sherbrooke, Quebec, Canada); Nayak, S. K. *Urology* 7(5): 488-491, 1976.

Attempts to obtain cell lines from bladder and renal cancer patients were made in 42 patients. Primary cultures were successfully obtained in 25 cases, and long-term cultures were obtained in 7 cases. Cell-mediated and humoral immunity was demonstrated in both tumors by microcytotoxicity in vitro. No cytotoxicity could be demonstrated against target cells obtained from metastatic cancer tissue. Abrogation of cell-mediated immunity by serum factors was demonstrated. No recurrence was obtained in the group of patients showing positive lymphocytotoxicity during followup.

1487 KILLER CELLS: A FUNCTIONAL COMPARISON BETWEEN NATURAL, IMMUNE T-CELL AND ANTIBODY-DEPENDENT IN VITRO SYSTEMS. (Eng.) Kiessling, R. (Dept. Tumor Biology, Karolinska Inst., 104 01 Stockholm 60, Sweden); Petranyi, G.; Karre, K.; Jondal, M.; Tracey, D.; Wigzell, H. *J Exp Med* 143(4): 772-780; 1976.

A functional study was carried out, comparing in parallel the naturally occurring killer cell (NK) system, the T cell killing across an H-2 barrier (anti-P815), and the antibody-dependent cell-mediated chicken red blood cell (CRBC) system. In contrast to the effector cells in the RBC system, the NK cells were insensitive to erythrocyte antibody complement (EAC) rosette depletion and would pass through nylon wool columns. NK activity was not inhibited by the presence of heat-aggregated human or mouse gamma globulin in contrast to the strong inhibition noted in the CRBG system. The NK system and the immune P815 system were sensitive to trypsin pretreatment, whereas the CRBC system was relatively trypsin resistant. Antitheta plus complement eliminated the anti-P815 activity, but did not touch the NK activity. The NK cells look like small lymphocytes but have none of the surface characteristics of either T or B cell lymphocytes or monocytes. They appear to possess a natural inborn reactivity much like an immune response.

1488 CYTOTOXICITY OF ANTIBODY-PHOSPHOLIPASE C CONJUGATES ON CULTURED FRIEND LEUKEMIA CELLS (Letter to Editor). (Eng.) Flickinger, R. A. (Div. Cell and Molecular Biology, State Univ. New York, Buffalo, N. Y. 14214); Trost, S. R. *Eur J Cancer* 12(2): 159-160; 1976.

Phospholipase C was conjugated to Friend leukemia (polycythemic strain) tumor antibodies and tested for cytotoxicity on homologous tumor cells. Antibodies were obtained by immunizing DBA/2 mice with formalin-treated leukemic spleen cells. Nine ip injections (1×10^7 cells) were given six days apart. Four days after the last injection, the mice were bled and the serum collected. To conjugate precipitated serum globulin fractions to phospholipase C, dialyzed globulins (0.5 ml) were added to phospholipase C (50 mg), then 1% glutaraldehyde (0.02 ml) was slowly added. After two hours, the mixture was dialyzed to remove unreacted glutaraldehyde. Conjugates were precipitated, with saturated $(NH_4)_2SO_4$, washed, dialyzed thoroughly, and sterilized. Spleen cells were cultured in vials. Both normal serum and immune serum were diluted with equal parts of tumor cell suspension and cultured for 24 hr. Normal spleen cells cultured with normal medium showed 88% viability, and when cultured with conjugate there was similar viability (84% at 0.6% conjugate dilution and 82% at 1.2%). Leukemic spleen cells incubated with normal medium showed 75% viability, and when incubated with 0.6% conjugate, viability was 2.1%. At 1.2% conjugate viability was 0%. Therefore, antibodies to Friend leukemia conjugated to phospholipase C retained both enzymatic and immunologic capacities.

1489 EPIDERMAL CYTOPLASMIC ANTIBODIES: INCIDENCE AND TYPE IN NORMAL PERSONS AND PATIENTS WITH MELANOMA. (Eng.) Abel, E. A. (USPHS Hosp., Bay St. and Vanderbilt Ave., Staten Island, NY 10304); Bystryn, J.-C. *J Invest Dermatol* 66(1): 44-48; 1976.

Antibodies to epidermal cytoplasmic antigens were present in 25% to 34% of 32 normal persons and in 34% to 50% of 53 patients with melanoma. There were at least two different types of cytoplasmic antibodies. The most common reacted to cytoplasmic antigens present only in the upper layers of the epidermis. This type of antibody occurred with equal frequency in patients with melanoma and in normal persons. These antibodies probably arose as a result of accidental introduction of epidermal antigens into the dermis following trauma or a pathological process. The increased incidence of cytoplasmic antibodies in melanoma was due to antibodies to cytoplasmic antigens present throughout the epidermis. These antibodies were 2.5 times more common in patients with melanoma than in normal persons. The presence of different cytoplasmic antigens in distinct strata of the epidermis suggests that they result from epidermal cell differentiation. The epidermal cytoplasmic antigens present throughout the epidermis appear to cross-react partially with cytoplasmic antigens in melanoma cells.

1490 CHARACTERIZATION OF HOMOLOGOUS ANTI-ALPHA-FETOPROTEIN ANTIBODIES PRODUCED IN RABBITS. (Eng.) Pihko, H. (Dept. Serology and Bacteriology, Univ. Helsinki, Haartmaninkatu 3, SF-00290 Helsinki 29, Finland). *Scand J Immunol* 5(3): 281-285; 1976.

Homologous anti-α-fetoprotein (anti-AFP) antibodies were characterized in the rabbit. The natural tolerance to AFP was broken in rabbits by immunizations with purified AFP from different species and homologous AFP chemically modified by haptenation. Some rabbits were boostered with rabbit AFP. The highest titers were obtained with human AFP, which shows a strong cross-reaction with rabbit AFP. The homologous antibodies were of lower activity than heterologous (sheep) antisera. Injections with rabbit AFP did not alter the avidity or titer. All antibodies produced by injections with human AFP could be absorbed with the original immunogen, and no reactivity against determinants unique to rabbit AFP could be found. The results indicate that the antibody activity against autologous AFP is based on cross-reactivity and that the immunizations did not make the autologous AFP immunogenic.

1491 CARCINOEMBRYONIC ANTIGEN-LIKE SUBSTANCES OF HUMAN BILE. ISOLATION AND PARTIAL CHARACTERIZATION. (Eng.) Svenberg, T. (Danderyd Hosp., Danderyd, Sweden). *Int J Cancer* 17(5): 588-596; 1976.

Because of a high frequency of positive carcinoembryonic antigen (CEA) tests among patients with nonmalignant liver diseases and because extremely high levels of circulating CEA are found only among patients dying from large liver metastases from gastrointestinal cancer, CEA-like material from human bile was investigated by enzyme-linked immunosorbent assay, electrophoresis, electroimmunoassay, rocket-line immunoelectrophoresis, and fused rocket-line immunoelectrophoresis. Three species of CEA-like macromolecules, biliary glycoprotein, (BGP) I, II, and III, were identified. BGP I was found in normal gallbladder bile and hepatic bile but not in bile subjected to inflammation (''white bile''). It was immunologically related to CEA and NGP (the "normal CEA-like glycoprotein," also know as NCA, CCEA-2, etc.). BGP I differed immunologically from CEA in that it lacked the tumor-associated determinants of CEA. It was different from NGP (and CEA) in that it contained BGP I specific determinants as revealed by anti-BGP I antibodies. In bile from gallbladders with obstructed outlet, subjected to cholecystitis, a nonmalignant inflammatory process, BGP I was replaced by BGP II and BGP III. Immunologically and physicochemically, BGP II and BGP III appeared to be closely similar to NGP and CEA, respectively.

1492 CARCINOEMBRYONIC ANTIGEN: ISOLATION OF A SUB-FRACTION WITH HIGH SPECIFIC ACTIVITY. (Eng.) Rogers, G. T. (Charing Cross Hosp., London W6 8RF, England); Searle, F.; Bagshawe, K. D. *Br J Cancer* 33(4): 357-362; 1976.

Four subfractions of carcinoembryonic antigen (CEA) were obtained by chromatography of conventional CEA on concanavalin A-Sepharose, and their immunoreactive contents were determined. Comparative studies showed that a fraction eluted with 2% methylglucoside (CEA 2B) had the highest activity, with a potency (60 U/μg) twice that of unfractionated CEA, although appreciable activity was also found in the other fractions. The amino acid composition of CEA 2B was similar to that reported for conventional CEA, but there was a lower content of neutral hexoses and a comparatively high content of N-acetylglucosamine. Experiments with a perchloric acid extract of a pool of sera from 11 patients with colonic cancer, which had been fractionated on concanavalin A-Sepharose, showed that nearly all the CEA activity was contained in a fraction eluted with 2% methylglucoside.

1493 ANTIGEN-REACTIVE CELLS TO TUMOR ANTIGENS IN NORMAL AND TUMOR PATIENTS. (Eng.) Falk, R. E. (Dept. Surgery, Univ. Toronto, Toronto, Ontario, Canada); MacGregor, A. B. *J Surg Res* 20(3): 247-253; 1976.

The leukocyte migration technique (LMT) was used to assess the cell-mediated response in patients with malignant disease. The response of patients with malignant melanoma and adenocarcinoma of the gastrointestinal tract and breast was compared to that of normal controls. The reactivity of peripheral blood WBC to tumor antigen and to BCG was measured. No significant difference was detectable between the response of controls and of the cancer patients at any stage of their disease. The results were not altered by serum factors, by the removal of phagocytic cells from the peripheral WBC, or by trypsin pretreatment of the cells. The tumor antigen reactivity detectable in the patients did not correlate with the progression of the malignant disease.

1494 SYNTHESIS OF SECRETORY COMPONENT BY HUMAN COLON CANCER CELLS. (Eng.) Huang, S.-W. (Univ. Maryland Hosp., 22 South Greene St., Baltimore, MD 21201); Fogh, J.; Hong, R. *Scand J Immunol* 5(3): 263-268; 1976.

Three lines of human colon cancer cells were studied to investigate the long-term synthesis of secretory component (SC). These SC molecules could be demonstrated both on the cell surface and in the cytoplasm by immunofluorescence. Regeneration of SC was demonstrable after trypsinization of the cells. In culture, two lines of carcinoma epithelium incorporated [^{14}C]leucine into newly synthesized SC. These cell lines should provide useful preparations for studying the details of immunoglobulin-SC interactions.

1495 ANTIGENIC COMPOSITION OF SOME TUMOR LIKE LARYNGEAL FORMATIONS. (Rus.) Medvedev, V. S. (M. F. Vladimirskii Moscow Regional Clinical Scientific Res. Inst., Moscow, USSR); Chumakov, F. I.; Zatseda, T. V. *Vestn Otorinolaringol* (5): 59-60; 1975.

Immunoelectrophoresis was used to study the antigen composition of albumin deposits and inflammatory laryngeal hyperplasias in 29 patients. Albumin masses ranged in diameter from 3-4 to 7-8 mm. Immunoelectrophoresis revealed 1 albumin fraction in 14/16 masses and 2 fractions (albumin and γ-globulin) in the other 2 masses, which contained some plasma cells and elements of inflammatory reaction. Investigation of inflammatory hyperplasias in six patients showed albumin, gamma-globulin, and α_1 A-globulin. Five to six antigens were detected in the five patients with fibrocytes and fibroblasts in albumin deposits, and immunoelectrophoresis of the two fibromas of the larynx revealed eight antigens. Each type of protein pseudotumor has its own antigen characteristics, determined by cellular elements as well as by blood plasma albumin composition.

1496 THE DETECTION BY IMMUNODIFFUSION OF TUMOUR ASSOCIATED ANTIGENIC COMPONENTS IN EXTRACTS OF HUMAN BRONCHOGENIC CARCINOMA. (Eng.) Watson, R. D. (Dept. Microbiology, Univ. British Columbia, Vancouver, British Columbia V6T 1W5, Canada); Smith, A. G.; Levy, J. G. *Br J Cancer* 32(3): 300-309; 1975.

The antisera to extracts of a variety of bronchogenic carcinoma were raised in rabbits and extensively absorbed with immunoadsorbents prepared with normal lung extracts, cyanogen bromide linked to Sepharose 4B, and glutaraldehyde insolubilized normal lung extracts. Antisera were tested by immunodiffusion against a panel of extracts from bronchogenic carcinoma, fetal lung extracts and pools of normal lung extracts. Two distinct antigenic components were associated with bronchogenic carcinoma: 1 present in a high percentage of the tumor extracts tested and having partial identity with a fetal lung component, and 1 (or more) not fetal and having higher cross-reactivity with tumors of the same pathological type. Attempts to detect either antibody or antigens relating to these components in the serum of patients with bronchogenic carcinoma by these techniques were not successful.

1497 SMOOTH MUSCLE ASSOCIATED ANTIGEN IN ASTROCYTES AND ASTROCYTOMATA. (Eng.) Toh, B. H. (Monash Univ. Medical Sch., Melbourne, Victoria 3181, Australia); Muller, H. K.; Elrick, W. L. *Br J Cancer* 33(2): 195-202; 1976.

Four human and four ethylnitrosourea-induced rat astrocytomas and mammalian adult brain and spinal cord were examined by indirect immunofluorescence with human serum containing smooth muscle antibody. Cryostat sections of astrocytomas showed staining of the tumor cell cytoplasm and processes, while in normal adult brain and spinal cord the entire astrocyte stained. Impression film and tissue culture monolayers of astrocytomas showed staining of cell processes and a fine, filamentous network in the cell body. The reaction with astrocytoma tumor cells was stronger than that with the corresponding normal astrocytes. Specificity of the staining reaction was established by its prevention on neutralization absorptions of the serum with extracts or homogenates of smooth muscle from pig stomach. The presence of smooth muscle-associated antigen in astrocytes and astrocytomas is indicative of contractile protein providing a mechanism of cell movement in vivo.

1498 NO DETECTABLE REITERATION OF GENES CODING FOR MOUSE MOPC 41 IMMUNOGLOBULIN LIGHT-CHAIN mRNA. (Eng.) Farace, M.-G. (Dept. Pathology, Univ. Geneva Faculty Medicine, Geneva, Switzerland); Aellen, M.-F.; Briand, P.-A.; Faust, C. H.; Vassalli, P.; Mach, B. *Proc Nat Acad Sci USA* 73(3): 727-731; 1976.

RNA fractions rich in immunoglobulin light (L)-chain messenger RNA (mRNA) were isolated from mouse myeloma MOPC 41, and chemically labeled with ^{125}I. These RNA fractions were hybridized with MOPC 41 DNA under conditions of DNA excess. Hybridization conditions were chosen under which the entire sequence of the L-chain mRNA probe, including the variable region, remained available for hybridization throughout the reaction. The hybridization (C_0t) curve showed double transition kinetics, with one component corresponding to about 250 gene copies and the other to about 2-4 copies. In contrast, when MOPC 41 L-chain mRNA was further purified as a single band by gel electrophoresis in 99% formamide, the hybridization curve showed only a single transition, corresponding to about 2-4 genes, with the disappearance of the 'reiterated' component. That component resulted, then from contaminating RNA species. No reiteration was detected by RNase or by hydroxylapatite for the genes corresponding to the entire sequence of MOPC 41 L-chain mRNA, including the untranslated segments, within the limits of detectability of short reiterated segments. It thus appears that there is only one, or very few, genes corresponding to the 41 L-chain variable region 'subgroup' in MOPC 41 DNA. The possibility that the variable genes of plasmocytes might result from a combination of several nonreiterated germline genes is discussed.

1499 SURFACE PROPERTIES OF T- AND B-CELLS IN LEUKAEMIC AKR MICE. (Eng.) Phondke, G. P. (Bio-Medical Group, Bhabha Atomic Res. Center, Modular Lab., Trombay, Bombay-400 085, India); Sundaresan, P.; Singh, B.; Sundaram, K. *Indian J Cancer* 12(4): 405-415, 1975.

Electrophoretic mobilities (EPM) of all suspensions of T- and B-cells from normal and leukemic AKR mice were measured before and after treatment with neuraminidase (500 U/ml) and various specific antisera. T-cells were found to possess a higher surface concentration of sialic acid residues than B-cells, but this situation was reversed on malignant development. Isoantigen present only on the surface of T-cells disappeared upon the development of leukemia. There is considerable depletion in the concentration of surface immunoglobulin of B-cells. Concomitant with the loss of these surface antigens, the leukemic cells appeared to have gained some tumor-specific histocompatibility antigens. Similar studies were also carried out with normal and leukemic thymocytes. The surface sialic acid concentration of thymocytes was observed to be different from that of either T- or B-cells and was reduced as a result of malignancy. Isoantigen present on normal cells could be detected in the case of leukemic cells. Immunoglobulins were absent from the surface of both normal and leukemic cells. The tumor-specific histocompatibility antigens also appeared to have emerged on the surface of leukemic thymocytes.

1500 INTERACTION OF IgE WITH RAT BASOPHILIC LEUKEMIA CELLS-V. BINDING PROPERTIES OF CELL FREE PARTICLES. (Eng.) Metzger, H. (Natl. Inst. Arthritis, Metabolism, and Digestive Diseases, Natl. Insts. Health, Bethesda, MD 20014): Budman, D.; Lucky, P. *Immunochemistry* 13(5): 417-423; 1976.

Particulate material from sonicated rat basophilic leukemia cells was isolated and examined for its ^{125}I-IgE binding properties by a rapid filter assay. The binding was saturable and was stoichiometrically inhibited with unlabeled IgE. Binding parameters (at 37 C) were similar to those observed with intact cells, although the forward rate constant was up to two times higher (2×10^5 M^{-1} sec^{-1}), while the backward rate constant was 2-3 times smaller (approximately 5×10^{-6} sec^{-1}), yielding an estimated Ka of 4×10^{10} M^{-1}. The binding activity was irreversibly lost after brief exposure to temperatures above 50 C and at pH's above 9 or below 5. The activity was largely resistant to proteolytic enzymes and neuraminidase, but not to phospholipase C. At a concentration of about 0.125%, Nonidet P40 and Triton X-100 both led to apparent disruption of the particles.

1501 MALIGNANT TRANSFORMATION OF T-CELLS IN LEUKAEMIC AKR-MICE. (Eng.) Phondke, G. P. (Bio-Medical Group, Bhabha Atomic Res. Center, Modular Lab., Trombay, Bombay-400 085, India); Sundaresan, P.; Singh, B.; Sundaram, K. *Indian J Cancer* 12(4): 416-423, 1975.

Electrophoretic mobilities (EPM) of lymph node cells and thymocytes of 1- to 7-mo-old normal and leukemic AKR mice were measured. Mean EPM of both lymph node cells and thymocytes (-1.27μ/sec/V/cm) were found to be essentially constant up to 7 mo, at which age no spontaneous development of leukemia was observed. Mean EPM of leukemic cells (-1.01 μ/sec/V/cm), on the other hand, was significantly lower than that of their normal counterparts. While the surface charge density of B-cells in the leukemic animals remained unchanged, that of T-cells was significantly reduced.

1502 THE VARIABLE PATTERN OF CIRCULATING LYMPHOCYTE SUBPOPULATIONS IN CHRONIC LYMPHOCYTIC LEUKEMIA. (Eng.) Davis, S. (Veterans Admin. Hosp., East Orange, NJ 07019). *N Engl J Med* 294 (21): 1150-1153; 1976.

The percentages of T and B lymphocytes in 13 patients with chronic lymphocytic leukemia were determined at 2-wk intervals. One patient with "B-cell predominant" disease showed a decrease from 77% to 49% of circulating B cells, which bind heat-aggregated immunoglobulin and anti-human immunoglobulin. This patient had a comparable increase in T cells. The lymphocytes of three other patients, who originally had equal percentages of cells that bound heat-aggregated immunoglobulin and anti-human immunoglobulin, lost immunoglobulin determinants from 47% to 63% of cells without changing the proportion of cells with receptors for heat-aggregated immunoglobulin or for SRBC. The characterization of lymphocytes in chronic lymphocytic leukemia should include sequential determination of cell-surface markers for both T and B cells, since the disease does not represent a proliferation of B cells alone.

1503 OXIDATION-INDUCED LYMPHOCYTE TRANSFORMATION. (Eng.) O'Brien, R. L. (Mossman Lab. Experimental Pathology, Los Angeles, CA 90033); Parker, J. W. *Cell* 7(1): 13-20; 1976.

The current state of knowledge concerning the oxidative blastic transformation of lymphocytes is reviewed. Treatment of lymphocytes from a variety of species with periodate or neuraminidase-galactose oxidase under conditions giving rise to surface aldehyde groups stimulates lymphocyte mitogenesis. The kinetics of this response mimic those of blastogenesis induced by other nonspecific mitogens such as phytohemagglutinin, concanavalin A, and pokeweed mitogen. The response requires glass-adherent cells, either macrophages or B cells, and appears to involve predominantly T cells. The mitogenic signal can be transmitted to untreated lymphocytes by oxidized leukocyte populations, macrophages, or HeLa cells. This transmission appears to depend upon direct intercellular interaction, and the necessity for glass-adherent cells, the transmission of the signal to untreated cells, and the aggregation seen in leukocyte cultures after oxidizing treatments suggest cellular cooperation in accomplishing the induction of lymphocyte transformation. One might further postulate that not only is the linkage between cells or between sites on the same cell necessary for subsequent transformation, but that these linkages must remain relatively labile. Further studies are needed to determine to what extent this model system will ultimately contribute to understanding of the relationship between cell surfaces and the control of cellular proliferation.

1504 STUDIES ON THE FORMATION OF E-ROSETTES BY HUMAN T LYMPHOCYTES AND THYMUS CELLS. (Eng.) Galili, U. (Hebrew Univ.-Hadassah Medical Sch., Jerusalem, Israel); Schlesinger, M. *Isr J Med Sci* 11(12): 1357-1367; 1975.

The mechanisms involved in the formation of E-rosettes by human T lymphocytes were studied. The optimal temperature for the formation of E-rosettes was between 22 and 24 C, and few rosettes were formed below 5 or above 32 C. The formation of E-rosettes was rapid, the near-maximal proportion being formed within 20 min at 24 C. Neuraminidase treatment did not alter the kinetics of rosette formation at 24 C, but greatly increased the formation of rosettes at 24 C and 4 C; neuraminidase-treated peripheral blood lymphocytes (PBL), but not SRBC, gradually lost their ability to form rosettes when incubated for prolonged periods at 37 C prior to testing. The rate of disintegration of E-rosettes increased with increasing temperature. Of various metabolic inhibitors tested, only cytochalasin B, sodium azide, iodoacetate, and cortisol succinate significantly inhibited the formation of E-rosettes, and only the latter inhibited stable E-rosette formation at 37 C by neuraminidase-treated cells. Human T lymphocytes also formed rosettes with RBC from dogs and rhesus monkeys, but not with ox RBC. Exposure of human thymocytes or PBL to rabbit anti-human thymus serum (RAHT) inhibited the formation of rosettes with RBC from sheep, dog, or man, but not with RBC from rhesus monkey. The formation of rosettes with rhesus monkey, but not sheep, RBC was completely inhibited by exposure to EDTA, while incubation of PBL at 45 C for 30 min decreased their ability to form rosettes with RBC from either species.

1505 CHANGES IN THE PROPORTION OF T AND B LYMPHOCYTES IN HUMAN MALIGNANT NEOPLASIA IN RELATION TO THE CLINICAL STAGE. (Eng.) Babusikova, O. (Cancer Res. Inst., Slovak Acad. Sciences, 880 32 Bratislava, Czechoslovakia); Novotna, L.; Korec, S.; Schnekova, K.; Turkova, D.; Havrankova, M.; et al. *Neoplasma* 22(4): 413-421; 1975.

The formation of spontaneous (E - RBC) and immune (EAC - RBC, antibody, complement) rosettes of SRBC with peripheral blood T and B lymphocytes was used for quantitative assessment of these lymphocyte populations in tumor patients and control subjects. Relative counts of T and B lymphocytes were correlated with lymphocyte survival in short-term cultures using standard subtoxic doses of phytohemagglutinin (PHA). The mean value in normal control subjects for E rosettes (T lymphocytes) was 72.8%, and for EAC rosettes (B lymphocytes) 23.8% of lymphocyte population. The survival of lymphocytes in short-term cultures with PHA in control subjects was 55.3%. In tumor patients, the counts of E, EAC rosettes and percentage of lymphocyte survival in short-term PHA cultures were dependent upon the clinical stage. In patients with localized tumors, the values were similar to controls. In patients where dissemination of the tumorous process could be ascertained, a decrease of T lymphocyte counts, an increase of B lymphocyte counts, and a higher survival of peripheral blood lymphocytes in short-term cultures with PHA were observed.

1506 E ROSETTES IN LYMPHOPROLIFERATIVE DISEASES. (Eng.) Benesova, E. (1st International Clinic, Charles Univ., 128 08 Prague, Czechoslovakia); Hermansky, F.; Salkova, J. *Neoplasma* 23(1): 23-30; 1976.

The method of rosette formation with SRBC was used to investigate 12 healthy subjects, 32 patients with chronic lymphadenosis, and 37 patients with a diagnosis verified by biopsy of malignant lymphoma, 30 of which were classified as Hodgkin's disease. In the normal controls the percentage of E rosettes was 58% on average, while in patients with chronic lymphadenosis it decreased significantly down to a mean of 6%. In absolute values, however, the number of rosette forming lymphocytes was normal and even higher. In malignant lymphoma patients the percentage decrease was less striking than in those with chronic lymphadenosis, but the absolute number of rosette-forming lymphocytes was always lower. In two patients with infectious mononucleosis, there was a marked increase in E rosette levels; they returned to normal after the disease had disappeared. In two cases of adenomegalies (lipomelanotic reticulosis), the E rosette levels had also decreased. A dynamic study of the observed changes might contribute to a knowledge of the pathophysiology of lymphoproliferative diseases.

1507 INHIBITION OF MITOGEN MEDIATED LYMPHOCYTE BLASTOGENESIS BY ADENOSINE. (Eng.) Fox, I. H. (Wellesley Hosp., 160 Wellesley St. E., Toronto, Ontario, Canada); Keystone, E. C.; Gladman, D. D.; Moore, M.; Cane, D. *Immunol Commun* 4(5): 419-427; 1975.

The effect of adenosine on the proliferative response of human peripheral circulating lymphocytes to stimulation by concanavalin A, phytohemagglutinin, and pokeweed mitogen was evaluated. Increasing concentrations of adenosine substantially inhibited mitogen-mediated lymphocyte blastogenesis. Erythro-9(2-hydroxyl-3-nonyl)adenine·HCl enhanced the inhibitory effect of adenosine. Inosine had an inhibitory effect that was less than that of adenosine. Recently, adenosine has inhibited the cytolysis of tumor cells by sensitized mouse lymphocytes, and a related inhibition of immune function may account in part for the pathophysiological relationship between severe immunodeficiency disease and adenosine deaminase deficiency.

1508 HUMAN LYMPHOCYTE POTASSIUM CONTENT DURING THE INITIATION OF PHYTOHEMAGGLUTININ-INDUCED MITOGENESIS. (Eng.) Segel, G. B. (Univ. Rochester Sch. Medicine, Rochester, NY 14642); Lichtman, M. A.; Hollander, M. M.; Gordon, B. R.; Klemperer, M. R. *J Cell Physiol* 88(1): 43-48; 1976.

The K+ content of human lymphocytes has been examined during the initial 24 hr after exposure of cells to phytohemagglutinin (PHA). It has been confirmed that lymphocyte K+ exchanges rapidly for extracellular counterions during preparative washing, if cells are exposed to PHA. The use of a technique to measure cation content that did not require removal of cells from their culture medium indicated that K+ does not change for 24 hr following PHA treatment. Previous reports have demonstrated that an enhanced uptake of K+ occurred in lymphocytes treated with PHA. This increased uptake may be a compensatory change for an increased exodus, explaining the failure of K+ to change following lectin treatment. The increased turnover in K+ in lectin-treated cells may be an important event in mitogenesis, even though there is little net change.

1509 SCANNING ELECTRON MICROSCOPY OF MITOGEN-TRANSFORMED HUMAN LYMPHOCYTES. (Eng.) Polliack, A. (Hadassah Univ. Hosp., Jerusalem, Israel); Touraine, J. L.; De Harven, E.; Lampen, N.; Hadden, J. W. *Isr J Med Sci* 11(12): 1285-1298; 1975.

Scanning electron microscopy (SEM) was used to study the surface architecture of mitogen-transformed peripheral blood lymphocytes dried by the critical point method, to distinguish between the different blast populations produced by different mitogens, and to determine whether transformed blasts derived from B and T lymphocytes show significant differences in surface morphology. Mitogen-transformed blast cells displayed different types of surface architecture: smooth, with relatively few blebs or finger-like microvilli; villous, with large numbers of surface microvilli or rounded blebs; and monocytoid, with ridge-like profiles or ruffled membranes and only a few microvilli. Blasts with uropods assumed a characteristic hand mirror configuration with apparent polarization of the nucleus and cytoplasm; the uropod displayed scattered microvilli and filopodia with a rounded tuft-like extremity. The cell surface of most uropod-containing cells was smooth. Phytohemagglutinin-transformed blasts were larger in diameter than most control cells and contained a greater percentage of villous cells (55%) and smooth cells with uropods (about 20%). Pokeweed mitogen treatment produced similar changes, with an even greater percentage of villous cells (65%). Concanavalin A-transformed blasts were smaller than those transformed by the other mitogens, and over 90% were of the villous type. Phorbol myristate acetate-transformed blasts did not reach the characteristic size of blasts; about 20% were villous, 60% were smooth (about 20% of these had uropods), and about 20% had ruffles. These data illustrate the extent of the participation of the cell surface during blastic transformation.

1510 CHANGES IN THE TUMOR RESISTANCE OF THE ORGANISM AS A FUNCTION OF THE DATES OF UNSPECIFIC IMMUNOLOGICAL INTERVENTION. (Rus.) Volegov, A. I. (Moscow P. A. Gertsen Scientific-Res. Inst. Oncology, Moscow, USSR). *Vestn Akad Med Nauk SSSR* (12): 52-57; 1975.

1511 ABILITY OF DELAYED-TYPE HYPERSENSITIVITY REACTIONS TO DISTINGUISH TUMOR-ASSOCIATED ANTIGENS AND HISTOCOMPATIBILITY ANTIGENS IN SOLUBLE EXTRACTS FROM MURINE FIBROSARCOMAS. (Eng.) Kon, N. D. (Univ. Florida, Coll. Medicine, Gainesville, FL 32610); Forbes, J. T.; Klein, P. A. *Int J Cancer* 17(5): 613-620; 1976.

1512 CUTANEOUS DELAYED HYPERSENSITIVITY REACTIONS TO TUMOUR ASSOCIATED ABNORMAL COMPONENTS OF LUNG CANCER TISSUE EXTRACTS. (Eng.) Sega, E. (Laboratorio di Immunologia, Istituto Regina Elena per lo studio e la cura dei tumori, Rome, Italy); Fegiz, G.; Paolini, A.; Tosato, F.; Casella, M. C.; Citro, G. *ICRS Medical Science: Cancer* 4(3): 106; 1976.

1513 PULMONARY ASBESTOSIS AND AUTOIMMUNITY. (Eng.) Toivanen, A. (Dept. Medicine, Univ. Turku, 20520 Turku 52, Finland); Salmivalli, M.; Molnar, G. *Br Med J* 1(6011): 691-692; 1976.

1514 QUANTITATION OF THE IMMUNE REJECTION OF ALLOTRANSPLANTED AKR LEUKEMIC CELLS. (Eng.) Ducos, R. (Washington Univ. Sch. Medicine, St. Louis, MO 63110); Valeriote, F. *Transplantation* 21(4): 279-288; 1976.

1515 QUANTITATIVE STUDY OF LYMPHORETICULAR INFILTRATION INTO CANINE TRANSMISSIBLE VENEREAL SARCOMA. (Eng.) Yang, T.-J. (Dept. Pathology, Univ. Connecticut, Storra, CT 06268); Roberts, R. S.; Jones, J. B. *Virchows Arch [Zellpathol]* 20(3): 197-204; 1976.

1516 MITOTIC CHANGES IN NEUROBLASTOMA TRANSPLANTED INTO DENERVATED HOST TISSUE. (Eng.) Batkin, S. (Sch. Medicine, Univ. Hawaii, Honolulu, HI 96822); Rayner, M. D. *Res Commun Chem Pathol Pharmacol* 13(1): 145-148; 1976.

1517 KINETICS OF THYMUS-DERIVED LYMPHOCYTE COUNT CHANGES IN RATS AFFECTED BY GRAFT-VERSUS-HOST REACTION. (Eng.) Klobusicka, M. (Cancer Res. Inst., Slovak Acad. Sciences, 880 32 Bratislava, Czechoslovakia). *Neoplasma* 23(1): 11-21; 1976.

1518 THE GROWTH OF TUMOUR XENOGRAFTS IN THYMECTOMIZED HIGH DOSE IRRADIATED MICE RECONSTITUTED WITH SYNGENEIC BONE MARROW CELLS INCUBATED WITH ANTI-THYMOCYTE SERUM. (Eng.) Franks, C. R. (Guy's Hosp., London, SE1 9RT, England); Bishop, D.; Reeson, D. *Br J Cancer* 33(1): 112-115; 1976.

1519 THE LOCAL CELLULAR AND HUMORAL IMMUNE RESPONSE IN LUNG CARCINOMA (Abstract). (Eng.) Ioachim, H. L. (Dept. of Pathology of Lenox Hill Hosp., New York, NY 10021); Dorsett, B.; Paluch, E. *Lab Invest* 34(3): 319; 1976.

1520 NORMAL HUMORAL IMMUNITY IN HAIRY CELL LEUKEMIA (Letter to Editor). (Eng.) Lang, J. M. (Clinique des maladies du sang du Centre Hospitalo-Universitaire de Strasbourg, 67005 Strasbourg, Cedex, France); Giron, C.; Oberling, F.; Goetz, M. L.; North, M. L. *Biomedicine [Express]* 25(1): 41-43; 1976.

1521 ASSESSMENT OF CELL-MEDIATED IMMUNITY TO MALIGNANT MESOTHELIOMA BY MICROCYTOTOXICITY TESTS. (Eng.) Embleton, M. J. (Cancer Res. Campaign Labs., Univ. Nottingham, England); Wagner, J. C.; Wagner, M. M. F.; Jones, J. S. P.; Sheers, G.; Oldham, P. D.; Baldwin, R. W. *Int J Cancer* 17(5); 597-601; 1976.

1522 REACTIVITY OF ANTIBODY IN ACUTE MYELOID LEUKAEMIA WITH PROLIFERATION-ASSOCIATED NUCLEAR ANTIGEN(S). (Eng.) Russell, A. R. (Queensland Inst. Medical Res., Herston Road, Herston, Queensland, Australia 4006); Pope, J. H. *Clin Exp Immunol* 23(1): 83-90; 1976.

1523 DIFFERENTIATION OF ANTIGENIC MARKERS ON B CELLS AND ON ANTIBODY-FORMING CELLS. (Eng.) McKenzie, I. F. C. (Austin Hosp., Heidelberg, Victoria, Australia); Elliott, B. E.; Haskill, J. S. *Isr J Med Sci* 11(12): 1278-1284; 1975.

1524 BLOOD GROUP MN PRECURSORS AS HUMAN BREAST CARCINOMA-ASSOCIATED ANTIGENS AND ''NATURALLY'' OCCURRING HUMAN CYTOTOXINS AGAINST THEM. (Eng.) Springer, G. F. (Evanston Hosp., 2650 Ridge Ave., Evanston, IL 60201); Desai, P. R.; Scanlon, E. F. *Cancer* 37(1): 169-176; 1976.

1525 TUMOR-ASSOCIATED ANTIGENS IN GYNECOLOGIC CANCER. (Eng.) DiSaia, P. J. (Los Angeles County-USC Medical Center, Los Angeles, CA). *Clin Obstet Gynecol* 18(4): 87-108; 1975.

1526 WATER-SOLUBLE P-815 MASTOCYTOMA MEMBRANE ANTIGENS: SEPARATION OF TUMOUR-ASSOCIATED ANTIGENS FROM HISTOCOMPATIBILITY ANTIGENS. (Eng.) Clemetson, K. J. (Theodor Kocher Inst., Univ. Berne, Freiestr., 1, CH-3000 Berne 9, Switzerland); Bertschmann, M.; Widmer, S.; Luscher, E. F. *Immunochemistry* 13(5): 383-388; 1976.

1527 THE T_{24} LINE OF URINARY BLADDER CARCINOMA CONTAINING A TUMOUR-SPECIFIC ANTIGEN. (Eng.) Bubenik, J. *In: Host Environment Interactions in the Etiology of Cancer in Man. Proceedings of a Meeting Held at Primosten, Yugoslavia, 27 August-2 September 1972.* International Agency for Res. on Cancer and John E. Fogarty International Center of Natl. Insts. Health USA. (Lyon, France): pp. 337-341; 1973.

1528 LOCALIZATION OF CARCINOEMBRYONIC ANTIGEN IN BRONCHOGENIC CARCINOMAS BY AN IMMUNOPEROXIDASE METHOD--A PRELIMINARY REPORT (Abstract). (Eng.) Sun, N. C. (Sch. Medicine, Univ. Southern California, Los Angeles, CA 90007); Bennett, V. C.; Carpentier, C. L.; Terry, R. *Lab Invest* 34(3): 333; 1976.

1529 EFFECT OF ANTI-ALPHA-FETOPROTEIN SERUM ON GROWTH AND PLATING EFFICIENCY OF ALPHA-FETOPROTEIN-PRODUCING HEPATOMA CELLS IN VITRO. (Eng.) Nishina, K. (Okayama Univ. Medical Sch., Okayama, Japan); Tsutamune, T.; Tokiwa, T.; Miyazaki, M.; Sato, J.; Watanabe, A. *Acta Med Okayama* 29(4): 319-326; 1975.

1530 PRELIMINARY STUDIES ON THE TOPOGRAPHY OF H-2D AND MAMMARY LEUKAEMIA (ML) ANTIGENS ON DBA/2 MOUSE LEUKAEMIA CELLS. (Eng.) Kusnierczyk, P. (L. Hirszfeld Inst. Immunology and Experimental Therapy, Polish Acad. Sciences, Wroclaw, Poland); Peknicova, J. *Folia Biol (Praha)* 21(6): 435; 1975.

1531 CHARACTERIZATION OF A T-LYMPHOCYTE INHIBITOR IN THE SERUM OF TUMOUR-BEARING MICE. (Eng.) Levy, J. G. (Dept. Microbiology, Univ. British Columbia, Canada V6T 1W5); Smith, A. G.; Whitney, R. B.; McMaster, R.; Kilburn, D. G. *Immunology* 30(4): 565-573; 1976.

1532 IMMUNOGLOBULIN BINDING FACTOR (IBF) PRODUCED BY T CELLS: SELECTIVE INTERACTION WITH SLOW MIGRATING RABBIT IgG. (Eng.) Guimezanes, A. (Laboratoire d'Immunologie des Tumeurs, INSERM Centre Hayem, Hopital Saint-Louis, 75475, Paris Cedex 10, France); Fridman, W. H.; Kourilsky, F. M. *Ann Immunol (Paris)* 126(5/6): 541-551; 1975.

1533 IMMUNOHISTOLOGIC DEMONSTRATION OF CARCINOEMBRYONIC ANTIGEN IN TUMORS OF THE LUNG AND COLON (Abstract). (Eng.) Fenoglio, C. M. (Coll. of Physicians and Surgeons, New York, NY 10032); Bennett, S. J.; Marchand, A.; Pascal, R. R. *Lab Invest* 34(3): 315; 1976.

1534 DETECTION OF MONOCYTE SPECIFIC ANTIGEN ON HUMAN ACUTE LEUKAEMIA CELLS. (Eng.) Baker, M. A. (Toronto Western Hosp., 399 Bathurst St., Toronto, Ontario M5T 2S8, Canada); Falk, R. E.; Falk, J.; Greaves, M. F. *Br J Haematol* 32(1): 13-19; 1976.

1535 AN IgD MYELOMA PROTEIN WITH ANTI-STREPTOLYSIN O ACTIVITY. (Eng.) Swierczynska, Z. (Inst. Rheumatology, Warsaw, Poland); Wozniczko-Orlowska, G.; Maldyk, H. *Immunochemistry* 13(5): 379-382, 1976.

1536 DR. PEDRAZA'S REPLY (Letter to Editor). (Eng.) Pedraza, M. A. (Community Hosp. Springfield and Clark County, 2615 East High, Springfield, OH 45501). *Am J Clin Pathol* 65(3): 420; 1976.

1537 IgA LEVELS IN CANCER PATIENTS (Letter to Editor). (Fre.) Thabaut, A. (Laboratoire de Biologie medicale, H.I.A. Begin, 69, avenue de Paris, F 94160 Saint-Mande, France); Durosoir, J. L. *Nouv Presse Med* 4(40): 2883; 1975.

1538 LYMPHOCYTE FUNCTION IN HODGKIN'S DISEASE. (Eng.) Benninghoff, D. L. (Downstate Medical Center, 450 Clarkson Ave., Brooklyn, NY 11203); Girardet, R. *Lymphology* 9(1): 39-42; 1976.

1539 PRESENCE OF DIOCTYL-PHTHALATE IN IMMUNOGLOBULINS G IN NORMAL SUBJECTS AND IN PATIENTS WITH MYELOMA. (Fre.) De la Farge, F. (U.E.R. de Sciences Medicales de Toulouse Rangueil, 133, route de Narbonne, 31400 Toulouse, France); Valdiguie, P. *Clin Chim Acta* 65(2): 245-248; 1975.

1540 DIFFERENT SURFACE GLYCOPROTEIN PATTERNS ON HUMAN T-, B- AND LEUKEMIC-LYMPHOCYTES. (Eng.) Andersson, L. C. (Third Dept. Pathology, Univ. Helsinki, Helsinki, Finland); Wasastjerna, C.; Gahmberg, C. G. *Int J Cancer* 17(1): 40-46; 1976.

1541 IMMUNOLOGIC AND CYTOCHEMICAL CELL MARKERS IN NON-HODGKIN'S LYMPHOMAS (Abstract). (Eng.) Davey, F. R. (SUNY Upstate Medical Center, Syracuse, NY 13210); Stockman, J. A.; Gottlieb, A. J. *Lab Invest* 34(3): 312; 1976.

1542 ANTIGEN-BINDING STRUCTURES ON THE SURFACE OF T LYMPHOCYTES. (Eng.) Haemmerling, G. J. (Institut fuer Genetik, Weyertal, W. Germany); McDevitt, H. O. *Isr J Med Sci* 11(12): 1331-1341; 1975.

1543 FUNCTIONAL AND METABOLIC CHARACTERIZATION OF LYMPHOCYTES FROM PATIENTS WITH LYMPHOMA. (Eng.) Sagone, A. L., Jr. (Univ. Hosp.--N1031, 410 West Tenth Ave., Columbus, OH 43210). *J Reticuloendothel Soc* 19(3): 147-155; 1976.

1544 STUDY OF THE DNA OF GASTRIC TISSUE LYMPHOCYTES IN ULCEROUS DISEASE AND CANCER. (Rus.) Zakharova, T. I. (State Medical Inst., Alma-Ata, USSR). *Vopr Onkol* 21(12): 8-12; 1975.

1545 A FUNCTIONAL EVALUATION OF LYMPHOCYTES AND MACROPHAGES FROM THE TUMOR OF HODGKIN'S DISEASE (Abstract). (Eng.) Willson, J. K. V. (Dept. Pathology, Univ. Alabama Birmingham, Birmingham, AL 35294); Zaremba, J. L.; Pretlow, T. G., II. *Lab Invest* 34(3): 337-338; 1976.

1546 MACROPHAGES AND HUMAN MALIGNANT MELANOMA (Proceedings Abstract). (Fre.) Roubin, R. (Laboratoire de Recherches sur les Tumeurs de la Peau Humaine, Fondation A. de Rothschild et I.N.S.E.R.M., 29, rue Manin, 75019 Paris, France); Cesarini, J.-P. *J Microsc Biol Cell* 23(2): 73a; 1975.

1547 SEZARY TYPE CELLS IN RHEUMATOID SYNOVIAL FLUID (Letter to Editor). (Eng.) van Leeuwen, A. W. F. M. (Univ. Medical Center, Leiden, Netherlands); Meyer, C. J. L. M.; van de Putte, L. B. A.; de Vries, E.; de Man, J. C. H. *Lancet* 1 (7953): 248-249; 1976.

1548 MITOGENIC AND ADJUVANT ACTIVITY OF A METHANOL EXTRACTION RESIDUE (MER) OF TUBERCLE BACILLI ON MOUSE LYMPHOID CELLS IN VITRO. (Eng.) Ben-Efraim, S. (Sackler Sch. Medicine, Tel-Aviv Univ., Israel); Diamantstein, T. *Immunol Commun* 4(6): 565-577; 1975.

1549 A METHOD TO STUDY IN VITRO PROLIFERATION OF LYMPHOCYTES FROM INDIVIDUAL MICE ON REPEATED OCCASIONS. (Eng.) Horneffer, P. J. (Cornell Univ. Medical Coll., New York, NY 10021); Weksler, M. E. *J Immunol Methods* 11(2): 99-105; 1976.

1550 PROPERTIES OF BLAST CELLS IN 'CONTROL' CULTURES OF HUMAN BLOOD LYMPHOCYTES. PRELIMINARY NOTE. (Eng.) Farnes, P. (Rhode Island Hosp., Providence, RI); Harrison, P. E.; Barker, B. E. *Clin Exp Immunol* 24(1): 223-226; 1976.

1551 INHIBITION OF MITOGEN INDUCED BLASTOGENESIS BY 5'-DEOXY-5'-S-ISO-BUTYL ADENOSINE. (Eng.) Bona, C. (Institut Pasteur, 25 rue du Dr. Roux, 75015 Paris, France); Robert-Gero, M.; Lederer, E. *Biochem Biophys Res Commun* 70(2): 622-629; 1976.

See also:

* (Rev): 1218, 1228, 1229, 1230, 1231, 1232, 1233, 1234, 1235, 1262, 1263, 1264, 1265
* (Chem): 1305
* (Viral): 1378, 1386, 1395, 1396, 1414, 1416, 1428, 1434, 1443
* (Path): 1562, 1596, 1609, 1623, 1632

1552 PROLIFERATIVE ACTIVITY OF UNDIFFERENTIATED CELLS (BLAST CELLS) IN PRELEUKEMIA. (Eng.) Fischer, M. (Zentrum der Inneren Medizin, Abteilung fuer Haematologie, Theodor-Stern-Kai 7, D-6000 Frankfurt a.M., W. Germany); Mitrou, P, S.; Huebner, K. *Acta Haematol (Basel)* 55(3): 148-152; 1976.

The bone marrow cells from five patients with preleukemic conditions were examined histologically, and cell proliferation was monitored by autoradiography following the in vitro incorporation of ^{3}H-thymidine. All the patients had pancytopenia or bicytopenia, with a normal or increased cell density of the bone marrow. The percentage of undifferentiated blast cells accounted for less than 15% of the bone marrow cell population. In three of the patients, the complete picture of acute leukemia appeared after several months. The proliferative activity of the blast cells of the preleukemic patients was lower than that observed in normal hemopoiesis, and numerous transitional forms between blast cells and promyelocytes and myelocytes were observed. It is suggested that the number of blast cells remains constant over a prolonged period of time in preleukemia because they differentiate to morphologically ''normal'' cells along the hemopoietic chain.

1553 ANAEMIA AND THE INDUCTION OF MYELOID LEUKAEMIA IN RFM MICE. (Eng.) Coggle, J. E. (Dept. Radiobiology, Medical Coll., St. Bartholomew's Hosp., Charterhouse Square, London EC1M 6BQ, England); Gordon, M. Y. *Exp Hematol* 4(1): 48-55; 1976.

The induction of anemia in RFM mice, which have a high spontaneous incidence of myeloid leukemia, by removal of 50% of the blood vol, did not increase the incidence of myeloid leukemia during an observation period of 16 mo. An increased number of blast cells and of all granulocytic cells appeared with increasing age in both bled and control RFM mice. This increase could be related to the high incidence of myeloid leukemia in this strain.

1554 MYELOID LEUKEMIA DURING FANCONI'S ANEMIA (FA). (Pol.) Zawartka, M. (Woj. Specjalistyczny Szpital Dzieciecy, Zespol Nauczania Klinicznego AM w Krakowie, ul. Langiewicza 2, 25-381 Kielce, Poland); Restorff-Libiszowska, H.; Kowalski, R.; Litwiniszyn-Krzewicka, K.; Schejbal, J. *Wiad Lek* 29(2): 145-151; 1976.

A report of an 11-yr-old boy with Fanconi's anemia (FA) followed by malignant transformation is presented. The subject demonstrated delayed growth, underdeveloped sex organs, multiple developmental anomalies, and dermal superpigmentation since age 3. Subsequent increased growth, excessive development of the sex organs, and the appearance of secondary sex traits were probably due to early treatment with Methanabol and testosterone. Significant anemia with leukopenia and thrombocytopenia were noted at age 8. Three years later, myeloid leukemia during FA was diagnosed. The condition did not improve despite intensive treatment, and the subject died after 8 days of progressive deterioration.

1555 DIAGNOSTIC AND PROGNOSTIC SIGNIFICANCE OF PERIPHERAL BLOOD CULTURAL CHARACTERISTICS IN ADULT ACUTE LEUKAEMIA. (Eng.) Balkwill, F. R. (Dept. Medical Oncology, St. Bartholomew's Hosp., London EC1, England); Oliver, R. T. D. *Br J Cancer* 33(4): 400-410; 1976.

Several morphological and functional studies were made of acute myelogenous leukemia (AML) cell growth in a microculture system and in larger culture vessels. Fresh peripheral blasts from 58 untreated patients with AML or buffy coat cells from normal individuals were grown in medium 199 supplemented by L-asparagine and extra L-glutamine, and aliquots were added to tissue culture flasks or microtiter plates. These studies confirm that AML cells will proliferate actively in vitro without external growth stimulating factors, in contrast to normal peripheral blood. Evidence is presented that cells from morphologically identical types of leukemia vary in their capacity to differentiate from free-floating blast cells into plastic-adherent, phagocytic, trypsin-resistant macrophagelike cells with Fc and C_3 receptors. Preliminary analysis suggests that patients whose cells have the greatest capacity for differentiation have a better chance of achieving complete remission.

1556 SPINA BIFIDA AND ANENCEPHALY: MISCARRIAGE AS A POSSIBLE CAUSE. (Eng.) Clarke, C. (Nuffield Unit of Medical Genetics, Univ. of Liverpool, Liverpool, England); Hobson, D.; McKendrick, O. M.; Rogers, S. C.; Sheppard, P. M. *Br Med J* 4(5999): 743-746; 1975.

The etiological factors in the fetal development of children affected by anencephaly or spina bifida, or both (ASB) were examined. The most promising lead came from the hypothesis that ASB is usually due to an interaction between twin fetuses or between a fetus and residual trophoblastic material from the previous normal pregnancy, particularly when this is of the opposite sex to the propositus. The sex finding was not confirmed. Hydatidiform moles, like children with ASB, were usually female and moles and choriocarcinomas on the one hand and children with ASB on the other occurred in mothers of similar ages, but were to some extent reciprocal in geographical incidence. This suggested that trophoblastic disease might be a factor common to all three; if so, one would expect the frequency of miscarriages to be higher immediately before than immediately after the birth of an ASB child, since mole and choriocarcinoma seldom follow a normal pregnancy. An analysis of published data confirmed that this was almost certainly so. Hence residual pathological trophoblastic material from either a previous miscarriage or a co-twin may interact unfavorably with another fetus to produce ASB and this may be the primary cause of the condition. The hypothesis is consistent with the observed lack of concordance in twins, the high incidence in females, the maternal age effect, and the greater prevalence in social classes IV and V.

1557 PREMATURE CHROMOSOME CONDENSATION IN HUMAN LEUKEMIA.

(Eng.) Williams, D. M. (50 No. Medical Drive, Salt Lake City, UT 84132); Scott, C. D.; Beck, T. M. *Blood* 47(4): 687-693; 1976.

The presence of premature chromosome condensation (PCC) in seven patients is reported. Six patients had either acute myeloblastic leukemia or acute myelomonoblastic leukemia in association with the features of erythroleukemia, i.e., leukoerythroblastic reaction in the blood, and erythroid multinuclearity, ''megaloblastoid'' changes, and PAS-positive staining of erythroid precursor cells in the bone marrow. In all patients, erythroid multinuclearity was noted. However, not all patients with erythroleukemia exhibit PCC. In this series, three additional patients had similar bone marrow morphologic changes without PCC. The finding of PCC in erythroleukemia may have important implications in the etiology of this disorder.

1558 CERTAIN PATTERNS OF KARYOTYPE EVOLUTION IN CHRONIC MYELOGENEOUS LEUKAEMIA. CHROMOSOME ABNORMALITIES IN CML.

(Eng.) Prigogina, E. L. (Inst. Experimental and Clinical Oncology, AMS USSR, Kashirskoje Shosse, 6, 115478, Moscow, USSR); Fleischman, E. W. *Humangenetik* 30(2): 113-119; 1975.

G banding was used in a study of the chromosome banding patterns of leukemic cells in 15 patients with chronic myelogenous leukemia (CML). Twelve patients were examined during the terminal stage. Additional material at the distal end of the long arm of chromosome 9 was revealed in the leukemic cells of all patients. Translocation of the deleted segment of chromosome 22 on other chromosomes was not observed. Similar additional chromosome abnormalities were observed in 5 of 9 patients with aneuploid cell lines. The most frequent abnormalities were i(17q) and trisomy 8. The authors assume that one of the patterns of karyotype evolution in CML is: (a) t(9q+;22q-); (b) t(9q+;22q-),+i(17q),-17; (c) t(9q+;22q-),+i(17q),-17,+8; (d) t(9q+;22q-),+i(17q),-17,+8,+19.

1559 PREFERENTIAL INVOLVEMENT OF CHROMOSOMES NO. 8 AND NO. 21 IN ACUTE LEUKEMIA AND PRELEUKEMIA.

(Eng.) Yamada, K. (Natl. Medical Center Hosp., 1-Toyamacho, Shinjuku-ku, Tokyo 162, Japan); Furusawa, S. *Blood* 47(4): 679-686; 1976.

Chromosome analyses were performed by a direct method on bone marrow cells of 147 patients with acute leukemia and preleukemia. Fifty-three patients had aneuploid cell lines. Chromosome abnormalities due to structural alterations were observed in 48% of the aneuploid patients. Using the acetic/saline/Giemsa banding technique, the exact identification of the abnormal chromosomes was successfully made in 22 aneuploid patients. Even though variability between patients existed in the chromosome changes, the non-random occurrence of some chromosome abnormalities was revealed, involving most frequently chromosomes 8 and 21. Abnormalities of chromosome 22 were not encountered, contrasting sharply with the frequent involvement of this chromosome in chronic myelogenous leukemia. The significance of the preferential involvement of chromosomes 8 and 21 is discussed in relation to leukemogenesis.

1560 SUBACUTE MYELOID LEUKEMIAS WITH PHILADELPHIA CHROMOSOME.

(Fre.) Briere, J. (Institut de Recherches sur les Leucemies et les Maladies du Sang, Universite Paris VII, Hopital Saint-Louis, 2, place du Dr A.-Fournier, F 75475 Paris Cedex 10, France); Castro-Malaspina, H.; Tanzer, J.; Bernard, J. *Nouv Rev Fr Hematol* 15(4): 407-424; 1975.

Twenty-five cases of subacute myeloid leukemia Ph^1 positive (SML Ph^{1+}), a special pattern of chronic myeloid leukemia (CML) characterized at first evaluation by excessive amount of blasts in blood or bone marrow (myeloblasts > 20%), Ph^1 chromosome, and short evolution (median survival 14.5 mo) are reported. Age, spleen volume, and WBC count are similar to CML. However, the clinical course is more severe, with fever, bone pains, and anemia. Myelofibrosis, high circulating basophil polymorphonuclear count, and platelet and megakaryocyte abnormalities (in morphology and number) are frequently associated with blastic excess. The association of Ph^1 chromosome, excess of blasts, and bone marrow fibrosis distinguishes SML Ph^{1+} from CML with myelofibrosis, unusual cases of Ph^1 positive myelofibrosis with myeloid metaplasia, and Ph^{1+} positive acute leukemia. Forms of SML Ph^{1+} with heavy blastic involvement are probably transitional cases with Ph^1 acute myeloblastic leukemia. Prognosis is poorer than in CML but better than in acute blastic crisis after its chronic phase, which can be very similar to SML Ph^{1+} when seen for the first time.

1561 HISTIOCYTIC LYMPHOMAS WITH THE MARKER CHROMOSOME 14Q+.

(Eng.) Mark, J. (Central Hosp., S-541 01 Skovde, Sweden). *Hereditas* 81(2): 289-292; 1975.

Karyotype analysis of tumor cells was performed in two cases of histiocytic lymphoma. The tumor cells had an extra band at the end of the long arm of one chromosome 14. The marker 14q+ (mar IV in case 1, mar III in case 2) had identical morphology in the two cases. This chromosomal deviation had previously been believed to be specific to Burkitt's lymphoma. Both tumors were characterized by a restricted spread around the mode (stemline = 48, and 47 in case 1 and case 2) in the hyperdiploid

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region, and by very few polyploid cells. It is suggested that the different tumor types in the lymphoma group may have common evolutionary pathways.

1562 GASTRIC PLASMOCYTOSARCOMA WITH IgA DYSGLOBULINEMIA. (Fre.) Moneret-Vautrin, D. A. (C.H.U. Brabois, F 54500 Vandoeuvre-les-Nancy, France); Grilliat, J. P.; Gaucher, P.; Duheille, J.; Duprez, A.; Rauber, G.; Monlibert, L.; Weber, B. *Nouv Presse Med* 4(39): 2799-2803; 1975.

A 78-yr-old woman with gastric plasmocytosarcoma with immunoglobulin A (IgA) dysglobulinemia is described. Immunoelectrophoresis revealed a lambda chain gammopathy of IgA with urinary passage, no Bence Jones protein, no osteolytic lesions, no renal attack, and no medullary plasmocytosis. X-ray and anatomopathology uncovered a gastric plasmocytosarcoma with, as shown by immunofluorescence, many monoclonal IgA's (lambda chain). Because of the common medullary origin of the immunoglobulin-secreting cells, the similar clinical signs of a plasmocytosarcoma and a multiple myeloma, and the evidence derived from mouse and rat experiments, this type of case may be a link between a single plasmocytosarcoma and a multiple myeloma. As such, the discovery of a dysglobulinemia should be followed by a search for a plasmocytosarcoma.

1563 CELLULAR FEATURES IN DESMOID FIBROMATOSIS AND WELL-DIFFERENTIATED FIBROSARCOMAS. AN ELECTRON MICROSCOPIC STUDY. (Eng.) Stiller, D. (Inst. Pathology, Friedrich-Schiller Univ., Ziegelmuchlenweg 1, DDR-669 Jena, E. Germany); Katenkamp, D. *Virchows Arch A* 369(2): 155-164; 1975.

The ultrastructural cellular features of three desmoids and four well-differentiated fibrosarcomas were compared. The tumors were almost identical relative to qualitative traits. The majority of cells were fibroblast-like with certain morphological variations. Cells with characteristics of myofibroblasts were common, whereas cells with a organelle composition of classical fibroblasts were surprisingly rare. Considering the relation of cells to each other and to vessels, it is concluded that these tumor cells originate from preexisting fibroblasts.

1564 HAMARTOMA OF THE STOMACH IN CHILDHOOD. CASE REPORT AND REVIEW OF THE LITERATURE. (Eng.) Bogomoletz, W. V. (Queen Mary's Hosp., Roehampton, London, SW15-5PN, England); Cox, J. N. *Virchows Arch* [*Pathol Anat*] 369(1): 69-79; 1975.

The clinical symptoms, x-ray appearances, and anatomical description of a large gastric hamartoma in an 8-yr-old girl are presented. The mucosa of the stomach wall was made up of normal gastric glands intermingling with extremely elongated Lieberkuhn-like crypts, which pushed the hypertrophied muscularis mucosae downward in some places and breached it in others. The lesion presented some special characteristics in that its stroma was quite abundant, fibroblastic in areas, fibrocytic in others, or simply hyaline. The lesion was also heavily calcified. The literature of this condition in childhood is reviewed. The differentiation between true genuine hamartomas of the gastric wall and heterotopic (ectopic) tissues is stressed.

1565 ULTRASTRUCTURE OF THE SO-CALLED ''CHORDOID SARCOMA.'' EVIDENCE SUPPORTING CARTILAGENOUS DIFFERENTIATIONS (Eng.) Weiss, S. H. (Johns Hopkins Univ. Sch. Medicine, Baltimore, MD 21205). *Cancer* 37(1): 300-306; 1976.

An example of rare, distinctive neoplasm occurring in the soft tissue of the extremities, resembling chordoma, and variously termed 'chordoid sarcoma', 'chordoid tumor', and 'parachordoma' occurring in the flank of a 52-yr-old man is presented. The tumor lacked the ultrastructural features associated with chordomas. The tumor appeared to be elaborating an abundant matrix of sulfated acid mucopolysaccharide interspersed with collagen fibers in varying stages of maturation. These features suggest that the tumor is exhibiting chondroid, rather than chordoid, differentiation. Previous reports of extraskeletal myxoid chondrosarcoma bear a striking light microscopic and electron microscopic similarity to the 'chordoid sarcoma', suggesting that the latter is a variant of extraskeletal myxoid chondrosarcoma.

1566 GRAWITZ TUMOR IN CHILDREN. (Fre.) Rutsaert, J. (Faculte de Medecine, Universite Libre de Bruxelles, Brussels, Belgium); Hubert, J. P.; Abouhatem, R.; Dupont, M. *J Urol Nephrol* 81(10-11): 759-768; 1975.

The case history is reported of a 9-yr-old boy who, 4 yr after nephrectomy for renal cell carcinoma, died with infiltration approaching the spinal column and metastasis in the lung, liver, and lymph nodes. Although such cases are rare in persons under 20 yr, the number is increasing. Although hematuria and a palpable mass are generally first evident in both adults and children, the latter, unlike the former, do not present the classic triad of hematuria, soreness, and a palpable mass. Nor do children have polycythemia or hypertension. Histologically, the tumors are similar for both children and adults. Frequency and localization of metastases and the effect of treatment (nephrectomy followed by radiation treatment and chemotherapy) are the same for both. Prognosis is dependent on the degree of infiltration and whether metastasis is present.

1567 DYNAMICS OF MORPHOLOGICAL CHANGES IN THE SPLEEN IN LYMPHOGRANULOMATOSIS IN CHILDREN (RESULTS OF INVESTIGATION OF OPERATIONAL MATERIAL). (Rus.) Potapova-Vinogradova, I. N. (Inst. Pediatry, Acad. Medical Sciences USSR, Moscow, USSR). *Arkh Patol* 37(10): 18-24; 1975.

Spleens removed surgically from 11 boys and 6 girls (3-14 yr) with Hodgkin's disease were studied pathomorphologically. Hyperplasia of reticular tissue without signs of tumor growth was observed in six cases and a specific Hodgkin's disease process in the others. All patients in the first group were diagnosed with Hodgkin's disease upon investigation of previously biopsied neck lymph nodes. Five children received no specific treatment; one boy received radiation treatment followed by chemotherapy. The duration of the disease in these children was less than 1 yr. Despite characteristic but nonspecific spleen changes in the hyperplastic phase, the absence of Reed-Sternberg cells prevented a reliable diagnosis. Eleven children manifested specific Hodgkin's disease changes, which can be classified according to specific changes in the lymph nodes with separation of different morphological variants. Before surgery, three children in this group received no treatment; seven had one or two courses of radiation therapy, and one, radiation therapy combined with chemotherapy or hormone therapy. In both groups, the Hodgkin's disease process in neck lymph nodes preceded somewhat the development of specific changes in the spleen.

1568 CYTOGENETIC ANALYSIS OF LEUKOPOIETIC CELLS IN BOVINE LEUKOSIS.

(Rus.) Birbin, S. S. (Saratov Scientific Res. Veterinary Station, Saratov, USSR). *Veterinariia* (12): 37-42; 1975.

The authors studied karyotypes from bone marrow, lymph node, and spleen and from lymphocytes in the peripheral blood of 21 healthy animals, 29 cows in the initial (hematologic) stage of leukemia, and 5 at a later stage characterized by hyperplasia of the organs and tumor growth. Cytogenetic analysis revealed hypodiploid metaphases (56-59 chromosomes) in animals of all groups, with no differences in their number or quality. True hyperdiploid metaphases were absent in the bone marrow of animals in the initial stage of leukemia but some of these animals manifested small quantities of true hyperdiploid metaphases in the serum lymphocytes. All animals in the later disease stages had various quantitative and structural karyotypic anomalies in the lymph tissue, lymphocytes, and cells of pathologically changed lymph nodes (and occassionally in bone marrow cells), but hyperdiploidy was the major regularly occurring phenomenon.

1569 HISTIOCYTOSIS X. HISTOCHEMICAL STUDY OF INTRACYTOPLASMIC LIPIDS IN 3 CASES.

(Fre.) Barbey, S. (Hopital des Enfants Malades, 149, rue de Sevres, 75730 Paris Cedex 15, France); Despres, S.; Nezelof, C. *Pathol Biol* 23(8): 639-646; 1975.

The accumulated cytoplasmic lipids of the histiocytes in three cases of histiocytosis X (eosinophilic granulomas of the wing of the ilium, of the occipital region, and of the parietal region) were extracted differentially and studied histochemically. Of the large number of lipids found, the principal ones were: neutral lipids, phospholipids, and glycolipids, with a preponderance of cholesterol esters, lecithins, and cephalines. The high degree of unsaturation primarily involved the neutral lipids. The profusion of phospholipids did not exclude the abundance of neutral lipids. Morphological analysis showed that lipid accumulation is variable from one cell to another; this variation, only somewhat dependent on the degree of maturation and differentiation, prohibited the drawing up of a chemical profile. Histiocytosis X cells, in comparison to normal histiocytes, had a preponderance of cholesterol esters and an alteration of cholesterol esterification. The abundance of phospholipids indicates that the histiocytosis X cells may be distinguished by great membrane activity.

1570 HISTIOCYTIC MEDULLARY RETICULOSIS (MALIGNANT HISTIOCYTOSIS) IN ZAMBIA.

(Eng.) Hutt, M. S. R. (St. Thomas' Hosp., London and Central Hosp., Ndola, Zambia); Lowenthal, M. N.; Fine, J.; Jones, I. G.; Nag, J.; O'Riordan, E. C. *J Trop Med Hyg* 78(10/11): 239-242; 1975.

Fifteen cases (12 males, 3 females) of histiocytic medullary reticulosis are reported from Zambia. The age of patients at presentation demonstrated a wide range of 7-61 yr, with seven under 30 yr of age. Death usually occurred within 1-4 mo from the onset of symptoms. Postmortem examinations of the livers revealed enlargement, but large masses of tumor were not seen. All cases studied histologically showed an increased number of cells in the hepatic sinusoids; some of these were hypertrophied Kupffer cells, some were histiocytes, and others appeared to be atypical histiocytes with large irregular and often hyperchromatic nuclei. It is suggested that the high incidence of this disease in East and Central Africa is related to the continued stimulation of the reticulo-endothelial system in response to chronic malaria. The importance of liver biopsy in diagnosis is stressed.

1571 COMPARATIVE LIGHT AND ELECTRON MICROSCOPIC STUDIES OF ONCOCYTIC PITUITARY ADENOMAS.

(Ger.) Saeger, W. (Pathologisches Institut der Universitaet, D-2000 Hamburg 20, Martinistrasse 52, W. Germany). *Virchows Arch A* 369(1): 29-44; 1975.

In 108 surgically removed pituitary tumors studied with the light and electron microscopes, 19 adenomas (17.6%) were found in which oncocytic tumor cells constituted over 50% of all cells. In conformity with criteria distinguishing oncocytes, these cells had a fairly broad cytoplasm with finely granular or finely vacuolar structures and distinct cell membranes. The nuclei were predominantly round and moderately rich in chromatin, but also partially pyknotic. In paraffin-embedded sections, the tumors could not be clearly distinguished from chromophobic or moderately granulated acidophilic adenomas. In plastic-embedded sections, they could be identified by the typical filmy and finely granular nature of the cytoplasm, which was distinctly different from conglomerations of secretory granules. Ultrastructurally they were characterized by many densely packed mitochondria, some of which were swollen. Five tumors exhibited increased hormone-synthesizing organelles, two of which induced acromegaly. The oncocytic pituitary adenomas are thought to be secondarily transformed chromophobic or moderately chromophilic tumors that must be regarded as independent, endocrinologically inactive pituitary tumors. In addition to these purely or almost purely oncocytic tumors, another 12 adenomas (11.1%) with oncocytic parts constituting 10-50% of the tissue were found. Of these, five were moderately or distinctly acidophilic adenomas with clinical symptoms of acromegaly; the other two were mucoid cell adenomas associated with Nelson's syndrome.

1572 SUPRATENTORIAL HAEMANGIOBLASTOMA WITH POLYCYTHAEMIA. (Eng.) Perks, W. H. (Wythenshawe Hosp., Southmoor Rd., Wythenshawe, Manchester, M23 9LT, England); Cross, J. N.; Sivapragasam, S.; Johnson, P. *J Neurol Neurosurg Psychiatry* 39(3): 218-220, 1976.

The case of a 21-yr-old man with polycythemia and a vascular frontal lobe tumor that was histologically compatible with the diagnosis of hemangioblastoma is presented. A red cell mass estimation with ^{15}Cr-labeled RBC was 65.5 ml/kg. The highly vascular, angioblastic tumor was nonencapsulated, and it measured 4.3 x 3.7 x 2.6 cm. Review of the English literature revealed no other case of polycythemia associated with supratentorial hemangioblastoma.

1573 CYLINDROMA OF THE BREAST: A HISTOCHEMICAL AND HISTOGENIC STUDY. (Fre.) van Bogaert, L.-J. (Laboratoire de Pathologie et Cytologie Experimentale, Capucienenvoer 35, B-3000 Louvain, Belgium); Maldague, P.; Pham-Maldague, H.; Staquet, J.-P. *Virchows Arch (Pathol Anat)* 368: 157-165; 1975.

Six benign mammary cylindromas (from one man and five women, 42 to 68 yr old), which derive their morphology from extracellular mucosubstances, were studied histochemically. The presence of mucopolysaccharides (MPS) in the interstitial spaces surrounding the myoepithelial cells and in the myoepithelial cells themselves indicated that MPS origin is epithelial. These accumulated MPS found between the myoepithelial cells and their basal pole in normal and pathological mammary glands suggested that the origin of the cylindromas is also epithelial, probably the result of excessive secretion of MPS into the intercellular spaces.

1574 RISK FOR BREAST CANCER DEVELOPMENT DETERMINED BY MAMMOGRAPHIC PARENCHYMAL PATTERN. (Eng.) Wolfe, J. N. (Hutzel Hosp., Detroit, MI). *Cancer* 37(5): 2486-2492; 1976.

A classification of risk for developing breast cancer based solely on the appearance of the breast parenchyma by mammography classified patients into four groups. The study encompassed a 5-yr period and was done by reviewing the mammograms of 5,284 women over the age of 30. The classifications of risk are: N1, which signifies an essentially normal breast; P1, a breast involved with a prominent duct pattern to a minimal degree; P2, a breast involved with a prominent duct pattern to a moderate to severe degree; and DY, an extremely dense parenchyma, which usually denotes connective tissue hyperplasia. The average time of followup is approximately 2 1/2 yr. The four groups had an incidence of developing breast cancer of 0.1, 0.4, 1.7, and 2.2. These figures reflect increasing risk.

1575 PROOF OF ABSENCE OF PROSTAGLANDIN SECRETION BY THYROID MEDULLARY CARCINOMA WITH DIARRHEA. STUDY OF ONE CASE. (Fre.) Menage, J. J. (Hopital Bretonneau, F 37033 Tours Cedex, France); Besnard, J. C.; Guilmot, J. L.; Vandooren, M.; Neel, J. L. *Nouv Presse Med* 4(40): 2862-2864; 1975.

To determine if prostaglandins (PG) induce severe diarrhea, they were measured from the peripheral and suprahepatic blood of a 75-yr-old patient recently operated on for medullary carcinoma of the thyroid with multiple metastases. Contrary to the prevailing hypothesis, PG apparently did not induce the severe diarrhea. Treatment with aspirin and indomethacin, which block PG, did not ameliorate the diarrhea. Levels of the prostaglandins PGE_1, PGE_2, and $PGF_{2\alpha}$ were normal and uniform in peripheral venous and hepatic venous blood. The lack of ^{131}I-labeled arachidonic acid (a PG precursor) fixation in hepatic metastases eliminated the explanation that the uniform PG blood levels are due to an in situ destruction related to the presence of hepatic 15-dihydroxyprostaglandin dehydrogenase. This absence of fixation may, however, be due to a conformational alteration resulting from labeling. It is proposed that PG are not secreted by the hepatic metastases and so may not be responsible for the diarrhea.

1576 ADRENAL MEDULLARY HYPERPLASIA. A MORPHOMETRIC ANALYSIS IN PATIENTS WITH FAMILIAL MEDULLARY THYROID CARCINOMA. (Eng.) DeLellis, R. A. (Tufts Univ. Sch. Medicine, 136 Harrison Ave., Boston, MA 02111); Wolfe, H. J.; Gagel, R. F.; Feldman, Z. T.; Miller, H. H.; Gang, D. L.; Reichlin, S. *Am J Pathol* 83(1): 177-190, 1976.

In order to define the morphologic correlates of early catecholamine abnormalities (i.e., an increased ratio of epinephrine to norepinephrine) in a 10-member kindred with familial medullary thyroid carcinoma (MTC), a morphometric analysis based on a point-counting system to assess adrenal medullary volume was undertaken. These studies clearly revealed adrenal medullary hyperplasia, as reflected by a two-to three-fold increase in medullary volume and weight as compared to age- and sex-matched controls. The increase in total medullary mass resulted from diffuse and multifocal nodular proliferations of adrenal medullary cells primarily within the head and body regions of the glands. These results support the hypothesis that the pheochromocytomas in patients with familial MTC may, in fact, represent extreme degrees of nodular hyperplasia of the medulla.

1577 HISTOLOGICAL, HISTOCHEMICAL AND ULTRASTRUCTURAL STUDY OF A VESICAL PHEOCHROMOCYTOMA. (Fre.) Franc, B. (Service Central d'Anatomie Pathologique, Hopital Ambroise-Pare, Boulogne, France); Galian, P.; Boccon-Gibod, L.; Le Charpentier, Y.; Abelanet, R. *Ann Anat Pathol (Paris)* 20(4): 395-404; 1975.

A pheochromocytoma located on the bladder wall was found to have a histological structure comparable to that of the usual adrenal pheochromocytomas. It had remarkable cytological and architectural characteristics, with some clear and many dark cells; the latter contained black and oval granules. Both noradrenalin and adrenalin were present in the tumor (2.8 and 1.56 mg/g of tumor, respectively). The prognosis of such cases cannot be easily established histologically, but it is considered a rather common procedure. As supported by tumor pathology, vesical pheochromocytomas issue from the chromaffin paraganglions of the pheochromoblast of the chromaffin cells arising from the neural crest. Linkage of this type of tumor to the Amine Content Precursor Uptake and Decarboxylation system is considered.

1578 ULTRASTRUCTURE OF ELASTOSIS IN SCIRRHOUS CARCINOMA OF THE BREAST. (Eng.) Tremblay, G. (Faculty of Med., McGill Univ., Montreal, Canada). *Cancer* 37(1): 307-316; 1976.

The stroma of scirrhous breast carcinoma was found to correspond at the ultrastructural level to elastic fibers of various sizes and random orientation. These fibers displayed the two characteristic components, an amorphous core with a peripheral mantle of microfibrils. Interspersed among the elastic fibers were modified fibroblasts that exhibited an irregular contour with numerous cytoplasmic processes and indentations. Their cytoplasm contained abundant rough endoplasmic reticulum, prominent Golgi complexes, and bundles of filaments. In the extracellular space, elastic fibers were often closely apposed to the plasma membrane of the fibroblasts. Carcinoma cells were also observed in the elastic tissue. It is postulated that fibroblasts are the cells responsible for elastic fiber production.

1579 VIEWS ON THE HISTOGENESIS OF TUMORS OF THE TESTICLE AND OVARY IN LIGHT OF HUMAN EMBRYOLOGY. (Pol.) Przybora, L. (Szpital Miejski Polozniczo-Ginekologiczny, Poznan, Poland); Twardosz, W.; Strzyzowski, J. *Pol Przegl Chir* 47(6a): 831-842; 1975.

The authors attempt to explain human neoplasms by analyzing literature based upon human embryos, fetuses, and tissue from children and adults. Until now, interpretation of embryologic data has been limited primarily to animal development and could not be applied reliably to human tumors. In view of the agreement between human embryologic and fetal development and the differentiation of male and female gonadal neoplasms, a classification applicable to testicular and ovarian neoplasms is proposed that distinguishes epithelial, gonadal-epithelial, gonadal, gonadal-germinal, germinal, nonspecific, and metastasized tumors.

1580 IN VITRO ASTROCYTIC DIFFERENTIATION FROM EMBRYOID BODIES OF AN EXPERIMENTAL MOUSE TESTICULAR TERATOMA. (Eng.) VandenBerg, S. R. (Stanford Univ. Sch. Medicine, Stanford, CA 94305); Ludwin, S. K.; Herman, M. M.: Bignami, A. *Am J Pathol* 83(1): 197-206, 1976.

Astrocytic differentiation in monolayer cultures of ascitic embryoid bodies from the experimental teratoma OTT-6050 was studied by conventional light microscopy and by indirect immunofluorescence with antisera to glial fibrillary acidic (GFA) protein, a protein specific for astrocytes. Primitive neuroepithelial cells were identified in 24-hr cultures. Within 72 hr, two cell types diverged. One cell type, with a flattened epithelial morphology in early cultures, demonstrated delicate GFA protein-positive fibrils within 48 hr. In later cultures, this type progressively displayed more typical stellate astrocytic features, with denser, more compact GFA protein-positive fluorescence in the perinuclear cytoplasm and cell processes. As indicated by GFA protein expression, the appearance of astrocytes of typical morphology was thus preceded by biochemical differentiation. The second cell type, interpreted as neuroblastic, failed to demonstrate GFA protein and had a small perikaryon with slender bipolar processes that were argyrophilic with Bodian's protargol in late cultures. Divergent neuroepithelial differentiation occurred within mitotically active cell populations and proceeded without apparent tissue relationships to other germ layer derivatives.

1581 GIANT CONDYLOMA OR BUSCHKE-LOEWENSTEIN TUMOR. (Eng.) Netto, N. R., Jr. (Rua Augusta, 2347-3 Andar, Cep. 01413, Sao Paulo, Brazil); Chade, J.; Camargo, F. P. *Int Surg* 61(2): 105-107; 1976.

The case reports of two 27-yr-old men with Buschke-Loewenstein tumor and giant condyloma, respectively, are presented. In the first case, the tumor involved the glans, prepuce, and urethral meatus; amputation of the distal two-thirds of the penis was required, and the patient had no evidence of tumor 6 mo after surgery. The condyloma involved the perineal and perianal regions and required surgical resection and electrocauterization of the implantation base. Both cases were characterized by papillomatosis, acanthosis, and keratin deposition. The Buschke-Loewenstein tumor had a malignant clinical character but is histologically similar to the ordinary condyloma. The tumor grows deeply without invading the tissues, but compresses them and causes an intense inflammatory reaction. Treatment of the tumor with podophyllin and radiotherapy was not effective, and surgery is the accepted treatment.

1582 MUMMIFIED CUTANEOUS MIXED TUMOR. (Eng.) Tsoitis, G. (Dept. Pathol., Institut Pasteur, Paris, France); Brisou, B.; Destombes, P. *Arch Dermatol* 111(2): 194-196; 1975.

A 34-yr-old man had an unusual mummified left temporal cutaneous mixed tumor of 6 yr duration that had developed shortly (3 wk) after trauma. Microscopic examination showed a benign epithelial proliferation localized in the dermis that was composed of numerous glandular and ductal structures. The proliferation was embedded in a loose, fibrous, mucoid and locally ossified stroma. Apocrine-type tumor cells and pilar differentiation observed in the tumor could explain the presence of mummification.

1583 ERYTHEMA GYRATUM REPENS WITH METASTATIC ADENOCARCINOMA. (Eng.) Skolnick, M. (105 Brant Ave.,Brantford, Ontario, Canada N3P 3H4); Mainman, E. R. *Arch Dermatol* 111(2): 227-229; 1975.

The relationship of a cutaneous manifestation to malignant disease was studied in a 45-yr-old man with erythema gyratum repens (EGR) associated with metastatic adenocarcinoma. The patient had a marked increase of his eruption (which originated in the upper part of the chest), with uncontrollable pruritis that was unresponsive to steroid therapy. This culminated in an exfoliative dermatitis. A metastatic, undifferentiated adenocarcinoma was removed following a right-sided craniotomy. The patient then had complete cessation of his pruritis, with moderate improvement of his eruption. The relationship between the time of onset of the EGR and the discovery of the malignant disorder, as well as the effect of treatment of the malignant condition on the course of the EGR, was studied using all reported cases of EGR in the literature. The data suggest a highly probably relationship between the two.

1584 A DOMINANT FORM OF ADULT NEURONAL CEROID-LIPOFUSCINOSIS (KUFS' DISEASE) WITH AN ASSOCIATED OCCIPITAL ASTROCYTOMA: EARLY DIAGNOSIS BY CORTICAL BIOPSY. (Eng.) Brodner, R. A. (Mount Sinai Sch. Medicine, Fifth Ave. and 100th St., New York, NY 10029); Noh, J. M.; Fine, E. J. *J Neurol Neurosurg Psychiatry* 39(3): 231-238, 1976.

The case of a 24-yr-old man with a dominantly inherited form of Kufs' disease and an associated occipital astrocytoma is presented. This is the first reported case in which the diagnosis of Kufs' disease was made by a cortical biopsy several years before its expected clinical onset, which is at age 31. A unique feature of the tumor cells was the presence of intracytoplasmic fibers that were frequently arranged in parallel bands. The exact diagnosis made was (a) left occipital cystic Grade I astrocytoma with calcification and (b) neuronal ceroid-lipofuscinosis, consistent with a clinical diagnosis of Kufs' disease. It is suggested that if a family history of Kufs' disease is present, a cortical biopsy can be performed on a patient for diagnostic purposes as well as for genetic consultation.

1585 A CASE OF SKIN CARCINOMA DURING IMMUNOSUPPRESSIVE TREATMENT. (Pol.) Burghart-Czaplinska, M. (III Klinika Chorob Wewnetrznych Instytutu Chorob Wewnetrzynch AM, ul. Prof. Z. Keiturakisa 1, 80-742 Gdansk, Poland); Piotrowska-Sowinska, J. *Wiad Lek* 28(13): 1165-1168; 1975.

Skin epithelioma was reported in a 22-yr-old woman receiving immunosuppressive treatment for visceral lupus erythematosus. Inpatient therapy was initiated with daily administration of 90 mg of Encortone. The patient was discharged 3.5 mo later with complete remission of symptoms and improvement of laboratory findings. Her condition deteriorated after 10 mo of treatment with small doses of steroids. A 2-yr combined treatment with steroids and cytostatic drugs (Encortone, cyclophosphamide [Endoxan], and Leukeran) was initiated, with cytostatic therapy withdrawn upon achievement of total clinical remission. Small doses of steroids continued to be administered as the condition worsened, but treatment was stopped upon confirmation of pregnancy. The patient was delivered of a full-term infant with multiple developmental defects who died shortly after birth. Administration of a subsequent short-term, large dose of Encortone did not aggravate lupus symptoms. Approximately 2 yr after withdrawal of cyclophosphamide and 5 mo following withdrawal of Encortone, basal cell epithelioma was confirmed on the nose. The condition of the patient has been normal following radiation treatment and diathermy.

1586 BILATERAL TUMORS OF THE ACOUSTIC NERVE AND RECKLINHAUSEN'S DISEASE OBSERVED OVER SEVERAL GENERATIONS. HEREDITARY TUMORS OF THE ACOUSTIC NERVE. (Fre.) Alliez, J. (26, rue Edouard Delanglade, F 13006 Marseille, France); Masse, J.-L; Alliez, B. *Rev Neurol (Paris)* 131(8): 545-558; 1975.

Since 1933, four families have been found in Marseilles with bilateral tumors of the acoustic nerve spread over three generations in three families. The fourth shows only a cutaneous Recklinghausen neurofibromatosis in the second generation. The authors outline the clinical characteristics and compare these four families with similar ones in the literature. Bilateral and familial neurinomas of the eighth cranial nerves were found in 21 families, making a total of 111 cases, "unilateral neurinoma" being used as a term of comparison. Among the groups of cases published is a family with 43 cases over 6 generations. From the hereditary point of view, the phenomenon of anteposition is not always constant. From the evolutionary point of view, bilateral neurinomas are manifested earlier, clinically, than unilateral ones. Cutaneous manifestations of neurofibromatosis are more frequent if the neurinomas are bilateral and nonfamilial. Among tumors of the nervous system, meningiomas and gliomas have been found; other dysembryoplastic or degenerative tumoral associations are rare. The incidence of cutaneous symptoms is very low when the neurinoma is unilateral. The association of cutaneous symptoms with bilateral and familial neurinomas does not worsen the prognosis, but their presence is significantly more serious if the neurinoma is isolated. The significance of the association of cutaneous and nervous phakomatosis with this hereditary tumor is unknown.

1587 HEMANGIOPERICYTOMAS OF THE EAR-NOSE-THROAT REGION. (Fre.) Bremond, G. (C.H.U. U. Nord-Chemin des Bourrelly, 13326 Marseille, France); Garcin, M.; Bonnaud, G.; Magnan, J.; De Micco, C.; Abdul, S. *J Fr Otorhinolaryngol* 24(5): 381-386; 1975.

The case histories of three women (54, 28, and 73 yr) with hemangiopericytomas of the right sinus, trachea, and left glossoepiglottic crena are reported. Because of their clinically ambiguous symptoms (painless nodular tumefactions that appear slightly more frequently in women and around the age of 40), these rare tumors must be diagnosed histologically, although diagnosis is frequently difficult. The tumors are silver-colored vascular proliferations with numerous, well-developed capillaries in the midst of basically dense tumor tissue composed of rounded or elongated cells. They appear primarily in the cephalic region or, less frequently, in the ear, nose, and throat. The evolution of the hemangiopericytoma is slow; the interval between diagnosis and surgical excision, the recommended treatment, may be 30 yr. Prognosis, which is grave in many cases, especially if the tumor is localized to the head, must be evaluated over periods of at least 10 yr. Metastasis is frequent and predominantly strikes the bones, lungs, and liver. Tumors in children are rarely malignant.

1588 CLINICAL AND MORPHOLOGICAL FEATURES OF HEPATIC ANGIOSARCOMA IN VINYL CHLORIDE WORKERS. (Eng.) Makk, L. (Saint Anthony Hosp., Louisville, KY 40204); Delmore, F.; Creech, J. L., Jr.; Ogden, L. L., III; Fadell, E. H.; Songster, C. L.; Clanton, J.; Johnson, M. N.; Christopherson, W. M. *Cancer* 37(1): 149-163; 1976.

Fifteen male workers exposed to vinyl chloride developed angiosarcoma of the liver. Thirteen died of disease and two are currently living for short periods after diagnosis. Their ages ranged from 36-58 yr and their exposure time ranged from 4-27.8 yr. The most common presenting symptoms were fatigue, weight loss, and abdominal pain. Hepatomegaly followed by splenomegaly were the most common physical findings. Biochemical profiles proved to be of little value in detection or diagnosis. Of eight patients autopsied, distant organ involvement was present in two cases, duodenal involvement in one, and direct extension of tumor to adjacent organs or tissues in four additional ones. The remainder, diagnosed by open liver biopsy, revealed no tumor extension. The gross features of the tumors were hemorrhagic necrosis, cystic degeneration, fibrosis, and apparent multicentricity. The histologic features were those of the typical angiosarcoma found in a variety of sites with a wide range of cellular differentiation. The histologic diagnosis was often impaired by the extensive tumor necrosis. Elsewhere in the liver subcapsular fibrosis, a distinct type of portal fibrosis and endothelial cell hyperplasia with or without sinusoidal dilatation were noted.

1589 MYXOMA OF THE HEART: CLINICAL AND EXPERIMENTAL OBSERVATIONS. (Eng.) Symbas, P. N. (69 Butler St., S.E., Atlanta, GA 30303); Hatcher, C. R., Jr.; Gravanis, M. B. *Ann Surg* 183(5): 470-475; 1976.

During the past 12 yr, 13 patients with atrial (10 left and 3 right) myxoma were treated, and the clinical observations are reviewed. In addition, studies of experimentally produced thrombus in 30 dogs are described. Tumors of the left atrium produced signs and symptoms of mitral valve obstruction and/or subacute bacterial endocarditis, and those of the right atrium manifestations of tricuspid valve disease or of pulmonary embolus or hypertension. The diagnosis was established by arteriocardiography in eight patients, at surgery performed for suspected mitral stenosis in three patients, and at autopsy in two patients. Resection of the myxoma alone or with the atrial septum or atrial wall was effective (no evidence of recurrence) in 10 patients. Studies of experimentally produced (1.5-3 cm in diameter) left atrial thrombus in dogs divided into five groups and followed cineangiocardiographically and sacrificed from 14 days to 6 mo indicated that the implanted thrombus is absorbed over a 3- to 6-mo period. These experimental and human left atrial thrombi were found to be histologically and histochemically different from human atrial myxomas. Electron microscopic studies performed on some of the resected atrial myxomas suggested that the atrial myxoma cells are active cells of endothelial origin. These observations suggest that atrial myxoma is a primary tumor of the heart that can mimic other clinical entities.

1590 TYPES OF REACTION IN THE REGIONAL LYMPH NODES IN NON-METASTATIC AND MINUTE-METASTATIC CARCINOMA OF THE UTERINE CERVIX. (Eng.) Kozlowski, H. (Inst. Obstetrics and Gynecology, Medical Acad., Gdansk, ul. Kliniczna 1, Poland); Hrabowska, M. *Arch Geschwulsforsch* 45(7): 658-669: 1975.

Tissue reactions were studied in the regional lymph nodes of 68 patients with stage I or II invasive cancer of the uterine cervix. Two basic types of lymph node reactions were distinguished. In the first type, a reactive hyperplasia of sinusoidal histiocytosis predominated; in addition, distinct activation of lymphocyte production within the follicles was observed, and numerous aggregates of plasmacytoid cells occurred within the medullary cords. The second type of reaction was characterized by a fibroplastic reaction causing constriction and block of capsular lymphatic and blood vessels, the pseudotransformation into a hemolymph node, and hematoxyphilic atrophy of lymphoreticular tissue. The results indicate that predominance of the second reaction within regional lymph nodes makes conditions favorable for the production of distant metastases.

1591 EFFECT OF TOBRAMYCIN ON URINARY γ-GLUTAMYLTRANSFERASE ACTIVITY: STUDIES IN A CASE OF RENAL CARCINOMA. (Eng.) Beck, P. R. (Dept. Biochemistry, Belvidere Hosp., Glasgow, G4 0SF, Scotland); Chaudhuri, A. K. R. *Clin Chem* 22(4): 528-531; 1976.

γ-Glutamyltransferase (γ-GT) activity was studied in a man with recurrent *Escherichia coli* septicemia owing to pyonephrosis and renal carcinoma. The homogenization and enzyme histochemistry of the tumor confirmed that renal carcinoma did not contribute to the increased values in urine activity. The greater than normal activity of the enzyme in serum persisted postoperatively, and so was not related to the renal carcinoma. Although increased activity of γ-GT in the urine correlated with the administration of the aminoglycoside antibiotic, tobramycin, it was not determinable whether the change was the result of renal damage or the response to the drug.

1592 A STUDY ON THE CLINICAL SIGNIFICANCE OF URINARY β-AMINOISOBUTYRIC ACID IN PATIENTS WITH UROTHELIAL TUMOURS. (Eng.) Nyholm, K. K. (Skt. Lukas Stiftelsens Hosp., Bernstorffsvei 20, DK-2900 Hellerup, Copenhagen, Denmark); Sjolin, K.-E.; Hammer, M.; Knudsen, J.; Stahl, D.; Nielsen, H. R. *Biomedicine* 22(6): 509-516; 1975.

Urinary β-amnioisobutyric acid (β-AIB) was measured in 141 patients with urothelial tumors and 60 controls. Ninety-one patients were followed-up for an average of 2 yr, which included many determinations of the β-AIB excretion. Thirty-six patients died during the control periods. In 43 patients in whom β-AIB excretion was determined at the time of diagnosis, the incidence of abnormally high excretion increased with the grade of tumor cell dysplasia. Urinary excretion did not correlate with the clinical tumor stage. The type of treatment had no major influence on the excretion. Characteristic changes in the excretion preceding high-grade tumor recurrences were demonstrated. Autopsy findings with tumor tissue in the urinary tract and distant metastases were significantly correlated to a low urinary β-AIB in the terminal phase of the disease. The results are discussed in relation to the degradation of thymine, the dual origin of β-AIB and the tumor-host metabolism. It is concluded that urinary β-AIB can contribute to prognostic evaluation of malignancy, but it is not valuable as a general screening procedure for urothelial cancer.

1593 CHARACTERISTICS OF THE SEX CHROMATIN OF ''INTACT'' MUCOSA AND OF ADENOCARCINOMA OF THE RECTUM. (Rus.) Petrova, A. S. (Inst. Experimental and Clinical Oncology, USSR Acad. Medical Sciences, Moscow, USSR); Lazarev, I. M. *Lab Delo* (1): 9-11; 1976.

The presence of sex chromatin in the epithelium of rectal adenocarcinoma was studied and compared with that in the epithelium of intact mucosa of the intestines and the oral cavity. The subjects wre 20 men and 40 women with adenocarcinoma of the rectum. Sex chromatin was absent in the mucosal epithelium of the oral cavity and rectum and in the epithelial component of the tumor in male patients. However, masses of sex chromatin were found in female patients. In these patients, 38 tumors were of male type and two were intermediary (between male and female type). The findings indicate a clear transformation of epithelial sex chromatin in women not only in the tumor itself but also in the mucosal epithelium of the oral cavity and rectum. The most expressed sex shift was found in the epithelium of rectal adenocarcinoma.

1594 NUCLEAR VARIATIONS IN CELLS OF TWENTY HUMAN SOLID NEOPLASTIC TUMOURS. (Eng.) Nayar, S. (Whitman Lab., Univ. Chicago, Chicago, IL 60637); Sharma, G. P. *Indian J Cancer* 12(4): 400-404; 1975.

Twenty human solid neoplastic tumors were analyzed cytogenetically with special emphasis on the possible correlation between the chromosomal ploidy and the extent of nuclear variations. There seemed to be a definite correlation between the range of ploidy and the number of micronuclei per cell. The larger the number of micronuclei in the tumor cells, the greater was its tendency to adopt the subdiploid and/or lower ranges of ploidy, and the greater the number of macronuclei, the less was this tendency.

1595 KINETICS AND POSSIBLE REGULATION OF CRYPT CELL POPULATIONS UNDER NORMAL AND STRESS CONDITIONS. (Eng.) Potten, C. S. (Christie Hosp. and Holt Radium Inst., Manchester M 20 9 BX, England). *Bull Cancer (Paris)* 62(4): 419-430; 1975.

Crypts of the small intestine of the mouse were studied to determine their proliferative organization, particularly the existence, location, and number of stem cells. It was concluded that a small number of cells at the base of the crypt are the true stem cells. These cells may be pluripotent and produce Paneth, goblet, and columnar cells, and they probably regenerate the crypt after x-radiation. Radiobiological experiments indicate that the number of cryptogenic cells is less than

80 and the number of stem cells is about 20. The stem cells are located in the Paneth cell zone and apparently reproduce at half the speed of the proliferative cells. It is the stem cells that determine the response of the mucosa to therapeutic agents, probably play a role in carcinogenesis, and control the mechanisms of cell proliferation.

1596 IMMUNOCYTOMA, CANCER AND OTHER ASSOCIATIONS OF MONOCLONAL GAMMOPATHY: A REVIEW OF 224 CASES. (Eng.) Colls, B. M. (Christchurch Clinical Sch., Christchurch, New Zealand); Lorier, M. A. *NZ Med J* 82(549): 221-226; 1975.

The clinical, hematological and biochemical correlations of 224 consecutive unselected examples of monoclonal gammopathy were studied. The paraprotein frequency detected was IgG 62%, IgA 15.2%, IgM 10.3%, Bence Jones protein 8.9%, and in 3.6% the paraproteins were not identified. In half the monoclonal gammopathy was associated with an immunocytoma (myeloma in 82 and lymphoma in 30). In three cases the associated clinical disease was amyloidosis. In 36 cases (16.1%) the associated clinical disease was a nonlymphoproliferative malignant tumor. Monoclonal gammopathy may be a significant marker of malignancy in such cases. In 73 cases (32.6%) the associated clinical conditions were unrelated to the gammopathy although only 55 of these cases were sufficiently investigated to warrant classification as examples of benign monoclonal gammopathy. There was a strong correlation between Bence-Jones proteinuria and malignancy. Sixty-five patients demonstrated Bence-Jones proteinuria and in 59 of these a malignancy was detected. The association was strong between hypercalcemia and malignancy as this was present in all 27 of the cases with hypercalcemia. The relationship between Bence-Jones proteinuria and hypercalcemia was also strong and Bence-Jones proteinuria was detected in 73% of the hypercalcemic patients as opposed to 36.7% in the whole series. Hypercalcemia and Bence-Jones proteinuria, when found in a patient with monoclonal gammopathy, have a grave clinical connotation.

1597 A QUANTITATIVE ANALYSIS OF THE ULTRASTRUCTURE OF THE CELLS OF TUMOUR TISSUE CULTURES. (Rus.) Iagubov, A. S. (Moscow P. A. Gertsen Scientific Res. Inst. Oncology, Moscow, USSR). *Biull Eksp Biol Med* 80(10): 99-102; 1975.

The ultrastructure of the mitochondrial, ergastoplasmatic, and polyribosomal apparatus of the cells of primary and continuous tumor cultures was studied morphometrically. Cultures were taken from rat reticulum cell sarcoma-321 and hamster sarcoma induced by human adenovirus serotype 12 and also from human larynx and stomach cancers. Qualitative analysis showed significant differences in cell structural organization of the energy- and protein-synthesizing apparatus in primary and continuous tumor cultures. As a whole, however, these groups differed markedly in the organization of the cytoplasmic protein-synthesizing apparatus. A more reduced ergastoplasm and more prominent polyribosomal apparatus characterized the continuous cultures. Cultivation on glass may have contributed to the further restructuring of the protein-synthesizing apparatus into the synthesis of nonspecific substrates necessary for the growth and multiplication of the cell mass.

1598 NEOPLASTIC DISEASE OF YAQUINA BAY BIVALVE MOLLUSKS. (Eng.) Mix, M. C. In: *Proceedings of the Thirteenth Annual Hanford Biology Symposium.* Oregon State Sea Grant Coll. Program. (Corvallis): Vol. 1, pp. 369-386; 1975.

A cellular proliferative disorder that superficially resembles mammalian leukemia was found in several species of pelecypod mollusks from Yaquina Bay, Oregon. The history of the disease and its cytomorphological and histopathological characteristics, moluskan oncology, and cell renewal are reviewed, and current research on the neoplastic disease of bivalve mollusks is described. Histologically, these disorders are characterized by diffuse collections of abnormal, mitotically active cells that invade and replace the Leydig tissue.

1599 SCANNING ELECTRON MICROSCOPY OF NORMAL AND CARCINOMATOUS HUMAN PROSTATE (Abstract). (Eng.) Gyorkey, F. (Baylor Coll. Medicine, Houston, TX 77211); Daskal, I.; Gyorkey, P. *Lab Invest* 34(3): 339-340; 1976.

1600 MULTIPLE VACUOLES FORMATION IN ERYTHROBLASTS IN AN ERYTHROLEUKAEMIC PATIENT. (Eng.) Miura, A. B. (Akita Univ. Sch. Medicine, Akita, Japan). *Scand J Haematol* 16(3): 183-188; 1976.

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1672 OCCURRENCE OF THE MALATE-ASPARTATE SHUTTLE IN VARIOUS TUMOR TYPES. (Eng.) Greenhouse, W. V. V. (Johns Hopkins Univ. Sch. Medicine, Baltimore, MD 21205); Lehninger, A. L. *Cancer Res* 36(4): 1392-1396; 1976.

1673 DNA METHYLASE: PURIFICATION FROM ASCITES CELLS AND THE EFFECT OF VARIOUS DNA SUBSTRATES ON ITS ACTIVITY. (Eng.) Turnbull, J. F. (Dept. Biochemistry, Univ. Glasgow, Glasgow G12 8QQ, UK); Adams, R. L. P. *Nucleic Acids Res* 3(3): 677-695; 1976.

See also:

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* (Chem): 1271, 1272, 1273, 1282, 1288, 1289, 1291, 1298, 1309, 1312, 1338, 1347, 1349, 1352
* (Phys): 1372, 1373, 1377
* (Viral): 1414, 1416, 1438, 1440, 1453, 1466
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1674 SPACE-TIME CLUSTERING: A CASE-CONTROL METHOD OF EXAMINING DISEASES WITH LONG LATENT PERIODS. (Eng.) Smith, P. G.; Pike, M. C. In: *Host Environment Interactions in the Etiology of Cancer in Man. Proceedings of a Meeting Held at Primosten, Yugoslavia, 27 August- 2 September 1972.* International Agency for Res. on Cancer and John E. Fogarty International Center of Natl. Insts. Health USA. (Lyon, France): pp. 35-38; 1973.

A case-control method of examining the clustering of diseases with long latent periods is presented. The approach is designed to detect evidence for a contagious element in the disease under study. In constructing a statistical test it is necessary to: (a) specify the kind of contact necessary for transmission of the disease (patient-patient or patient-carrier-patient); (b) postulate the susceptible and infective periods for each patient; and (c) select a suitable control group.

1675 PATTERN OF BLADDER CANCER IN THE SUDAN AND ITS RELATION TO SCHISTOSOMIASIS: A STUDY OF 255 VESICAL CARCINOMAS. (Eng.) Malik, M. O. A. (Natl. Health Lab., Khartoum, Sudan); Veress, B.; Daoud, E. H.; El Hassan, A. M. *J Trop Med Hyg* 78(10/11): 219-223; 1975.

A histological analysis of biopsy material from 255 Sudanese patients (216 males, 39 females) with proven bladder carcinomas was made in order to determine the morphological features of the neoplasms, and any possible association with schistosomiasis. The average age at presentation was 51.9 yr. Of the 255 tumors, 122 (47.9%) were transitional carcinomas, 101 (39.6%) squamous carcinomas, 26 (10.2%) anaplastic carcinomas, and the remaining six (2.3%) were adenocarcinomas. Associated schistosomiasis was detected in 49 (19.2%) cases, including 43.9% of the biopsy material demonstrating squamous carcinoma. The geographical incidence of bladder cancer is related to the endemic prevalence of schistosomiasis. The number of bladder cancers represents 3.1% of all malignancies in the Sudan, compared to 7.6% and 11% in Egypt and Mozambique, respectively, where the endemic levels of schistosomiasis are even higher. Squamous carcinoma has a particularly close association to schistosomiasis and accounts for a high proportion of all bladder cancers where the flukes are endemic; i.e., 62.3% of all bladder tumors in Egypt, compared to 1.6% in England.

1676 CANCER OF THE ALIMENTARY TRACT IN THE SUDAN: A STUDY OF 546 CASES. (Eng.) Malik, Mo. O. A. (Dept. Pathology, P. O. Box 192, Khartoum, Sudan); Zaki El Din, Z. A.; El Masri, S. H. *Cancer* 37(5): 2533-2542; 1976.

A total of 546 primary malignant alimentary tract tumors in Sudanese patients were analyzed for frequency, age, sex, site, geographic distribution, and clinicopathologic presentations and were compared with other series. The disease was much less frequent in the Sudan than in Western countries; within the Sudan itself it was much less prevalent in the South than the North. Generally, it occurred in younger age groups than in Western countries. Esophageal cancer was relatively common, especially in the Northern Province, and occurred predominantly in females. It may be caused by the type of food eaten. Rectal cancer was more frequent than colonic cancer per se, and occurred more frequently in males and in relatively young patients. Colonic cancer had a predilection for the caecum; its frequency, lower, than that of rectal cancer, indicates that the two may have separate etiologies. Alimentary cancer was apparently not related to intestinal bilharziasis or other granulomas, although these conditions may mimic malginancy clinically.

1677 CANCER EPIDEMIOLOGY IN CENTRAL ASIA. (Rus.) Saenko, A. I. (Kirghiz Res. Inst. Oncology and Radiology, Frunze, USSR). *Vopr Onkol* 21(11): 40-44; 1975.

The incidence of cancer in the Uzbek, Turkmen, Tadzhik, and Kirgiz Republics of Central Asia is reviewed. Overall oncologic morbidity for men and women is relatively low in Central Asia compared with the USSR and RSFSR. Except for cancer of the esophagus, the frequency cancer is lower in Central Asia than in other republics. Cancer of the skin, lower lip, mammary gland, and uterine cervix have particularly low indices of morbidity here. The unusually high incidence of cancer of the esophagus, the frequency of cancer is lower in Cenregional peculiarity that may be associated with high nitrosamine content in foods and other environmental factors.

1678 EPIDEMIOLOGY OF PRIMARY TUMOURS OF THE BRAIN AND SPINAL CORD: A REGIONAL SURVEY IN SOUTHERN ENGLAND. (Eng.) Barker, D. J. P. (Dept. Community Medicine, Univ. Southampton, England); Weller, R. O.; Garfield, J. S. *J Neurol Neurosurg Psychiatry* 39(3): 290-296, 1976.

An epidemiological study based upon 984 patients presenting with primary tumors of the brain, spinal-cord, and meninges was undertaken over a 9-yr period in the Wessex population of about 1.5 million. All patients were 15 yr of age or over. Each tumor type was characterized by age, sex, district, social class, and by rural or urban distribution. Standardized morbidity ratios for each tumor were calculated for each health district. Gliomas were the most common tumor, with an average annual incidence of 3.94 per 100,000; they occurred with a lower frequency in large urban areas. Grade 3-4 astrocytomas (glioblastoma multiforme) had a peak age-specific annual incidence of 7.53 per 100,000 in the 50- to 59-yr age group and were common in men. The peak incidence for oligodendrogliomas was also 50-59 yr, but for grade 1-2 astrocytomas it was 30-39 yr. Meningiomas had an average annual incidence of 1.23 per 100,000, with a peak incidence of 2.48 per 100,000 at 60-69 yr; they had a female predominance (female 1.76 per 100,000; male 0.64 per 100,000 . Rural districts had a lower incidence of meningiomas than did urban areas. There was some variation in the distribution of gliomas, meningiomas, and Schwannomas throughout the Wessex region, and there was a suggestion of geographical clustering of ependymomas, acoustic neuromas, and meningiomas. An excess of patients with grade 1-2 astrocytomas and oligodendrogliomas was seen in social classes 1 and 2, and a deficit in classes 4 and 5; a similar, but less marked, preponderance was seen with meningiomas.

1679 SIX YEAR MORTALITY RELATED TO CARDIORESPIRATORY SYMPTOMS AND ENVIRONMENTAL RISK FACTORS IN A SAMPLE OF THE NORWEGIAN POPULATION. (Eng.) Zeiner-Henriksen, T. (Norwegian Radium Hosp., Oslo, Norway). *J Chronic Dis* 29(1): 15-33; 1976.

A previous study, in which a sample of the general middle-aged Norwegian population was asked about their general environment and the presence of any cardiovascular symptoms, was followed up for mortality over a 6 yr period. The response rate with nearly 15,000 respondents was 82%. An excess number of middle-aged men living in urban areas, mainly due to deaths for cardiovascular diseases, was revealed. Little variation between the main regions of the country was seen when the mortality rates were adjusted for the urban/rural factor. Excess mortality among smoking males, but not females, was observed. Rising mortality with increasing tobacco consumption was not evident, but the age of initiation of smoking affected mortality among men. Mortality decreased consistently with increasing amount of physical exercise, most pronounced among men in manufacturing occupations. Men occupied in agriculture had low mortality. Mortality from coronary heart disease was higher among persons with no or slight physical exercise than among persons with moderate or much activity. The lower height, weight, and relative weight groups displayed highest mortality for both sexes. Higher mean weight and relative weight among the men who died from coronary heart disease than from other diseases was found.

1680 EPIDEMIOLOGY OF PROLIFERATIVE DISEASES OF THE HEMOPOIETIC SYSTEM IN THE LUBLIN PROVINCE IN THE YEARS 1962-1971. I. ACUTE AND CHRONIC LEUKEMIAS. (Pol.) Kowalewski, J. (Klinika Hematologiczna Instytutu Chorob Wewnetrznych AM, ul, Jarczewskiego 8, 20-950 Lublin, Poland); Pytko, H.; Dmoszynska, A.; Tomicki, A.; Ordynski, J. *Nowotwory* 25(4): 281-287; 1975.

The morbidity of leukemias in the Lublin province from 1962-1971 was analyzed on the basis of data collected from all provincial hospitals. During this period, the incidence of leukemias increased nearly twofold (from 3.32 per 100,000 population in 1962 to 6.34 in 1971). Leukemias were more frequent in men than in women (5.40 vs 3.24). The incidence of leukemias among urban and rural residents was 4.65 and 4.13, respectively. The morbidity of acute and chronic leukemias was similar. Leukemias were somewhat more frequent in the Cracow region than in the Lublin province, but both regions showed an increase in morbidity rates. Morbidity ranged from 2.3-3.0 among the northern counties of Lublin province to 5.1-7.0 in Lublin proper and several other counties.

1681 MALIGNANT NEOPLASMS OF THE COLON AND RECTUM IN EAST BERLIN, 1960-1969. (Ger.) Berndt, H. (Zentralinstitut fuer Krebsforschung der AdW der DDR, DDR--1115 Berlin-Buch, Lindenberger Weg 80, E. Germany); Diertich, D.; Hansche, G.; Hansche, R.; Werner, H.; Witt, K. *Arch Geschwulstforsch* 45(7): 670-684; 1975.

Factors associated with the detection and treatment of colonic and rectal cancer in Berlin are described for 1960-1969. The results were analyzed in comparison to other periods and regions. This study was based on the regional cancer registry. In the 10-yr period, 3,855 new cases were registered (colon 2,158; rectum 1,697). The proportion of old patients was high; 66% were 65 yr and older, and 28 were 75 yr or older. About 41% of patients sought medical advice within 4 wk after first symptoms, and about 60% of cancers were treated within 1 mo after first consultation. The localized stages I and II amounted to 46% of cases. There was only a loose relation between duration of history and stage of disease. In nearly 39% of cases radical operation was performed, and 27% were not treated by surgery. Five-year survival rates of colonic and rectal cancer in the period 1960-1964 amounted to 12% for all stages irrespective of method of treatment and 31% for patients after radical surgery. Survival rates depended on stage, mode of treatment, and age. In the period 1955-1973, the proportion of old patients increased, and the distribution of stages remained nearly constant, but the proportion of cases radically operated on increased by 3%. Comparison of Berlin and Erfurt showed only small differences. Compared with international reports, survival rate was very low in Berlin, presumably due to complete registration of new cases and a high number of very old people with colonic and rectal cancer.

1682 NEW PRIMARY CANCERS IN PATIENTS ORIGINALLY PRESENTING WITH CARCINOMA OF THE CERVIX. (Eng.) Mould, R. F. (Westminster Hosp., London SW1, England); Barrett, A. *Br J Obstet Gynaecol* 83(1): 81-85; 1976.

The case records of 4,502 women treated for carcinoma of the cervix at four London hospitals between 1925 and 1962 were reviewed in the attempt to determine the incidence of new primary cancers at other sites. Skin cancers were excluded as second primaries. A total of 116 other primary neoplasms were found in 113 patients. Tumors of the lung (22 cases), breast (20 cases), and colon/rectum (18 cases) occurred most frequently. The mean age at diagnosis of carcinoma of the cervix was 52.6 yr, and the mean age at diagnosis of the subsequent primary was 63.4 yr. Although all the breast cancers occurred within 11 yr and all of five bladder cancers occurred after 14 yr, the interval between diagnosis of the initial cervical cancer and the subsequent independent cancers varied widely for each tumor type. The results of the study show an incidence of 2.6% of other primary cancers in patients with carcinoma of the cervix. These and previously published data suggest a random distribution for the site of new primary cancers.

1683 CANCER OF THE CERVIX UTERI--AN EPIDEMIOLOGICAL SURVEY. (Eng.) Deeley, T. J. (Velindre Hosp., Whitchurch, Cardiff, Wales). *Clin Radiol* 27(1): 43-51; 1976.

Possible etiological factors in the development of cancer of the uterine cervix are discussed in terms of its incidence as shown by retrospective studies. Cervical cancer is more common among married women (it is virtually absent in nuns) and in multiparous women. The rarity of this tumor among virgins suggests a relationship to frequency of sexual intercourse. It is more common among women who had their first intercourse at a younger age (this may be the primary etiological factor), and it is more common among women who have been sexually promiscuous. Smegma has been implicated as a cause of carcinoma of both the cervix and penis. Vaginal infection may be a predisposing factor, and it has been suggested that spermatozoa may provide foreign nucleic acids to the receptive cells of the cervix. Contraceptive and hormonal effects are reported. Masturbation in early life has been implicated, but the incidence is no greater among lesbians. A low incidence has been reported for Amish, Jewish, Irish, and Italian women; higher than normal incidences have been reported for Puerto Ricans, Blacks, Mexicans, and Bantus. Prostitution is the only known occupation to have an effect. Higher socioeconomic status and rural living are associated with lower incidence. Detection of preclinical carcinoma by regular examination can contribute to early diagnosis, and some degree of prevention can be achieved through education.

1684 EPIDEMIOLOGY OF CANCER OF THE UTERINE CERVIX IN JAMAICA. (Eng.) Persaud, V. (No affiliation given). *West Indian Med J* 24(4): 171-178; 1975.

The etiology of carcinoma of the cervix uteri was investigated in a retrospective interview study of patients with histologically diagnosed lesions and suitably selected controls. Both groups were comprised predominantly of Blacks of low socioeconomic status. There was significant association between early age at first coitus, early and multiple pregnancies, and promiscuity with the development of the carcinoma. The factors of male circumcision and sexual hygiene could not be evaluated because of the paucity of reliable information. Also, information on contraception was not sufficient for statistical evaluation. The findings of this study seem to suggest that social environmental influences are largely responsible for the high incidence of cancer of the uterine cervix in Jamaica.

1685 EXPERIENCE IN MASS PAPANICOLAOU SCREENING AND CYTOLOGIC OBSERVATIONS OF TEEN-AGE GIRLS. (Eng.) Fields, C. (Dept. Health, City Chicago, Civic Center, Room LL-139, Chicago, IL 60602); Restivo, R. M.; Brown, M. C. *Am J Obstet Gynecol* 124(7): 730-734; 1976.

This report is based on a 7-yr (1962-1969) retrospective analysis of computerized data available from the Chicago Board of Health's Cancer Control Section and its Cytology Laboratory. All patients included were medically indigent. Cytologic specimens were obtained by the VCE technique; all Papanicolaou smears were classified with both the numerical and descriptive systems for abnormal cytology. The study cohort was composed of 33,641 teenage patients through age 19; 58 (1.7/1,000) had abnormal cytology (class III, IV, or V). Approximately 25% of the total patient load were teenagers under the age of 19 with an extremely low yield of suspect cytology: class III = 1.6/1,000; class IV = 0.1/1,000; class V = 0.0/1,000. The Chicago Board of Health has reduced the number of Papanicolaou smears taken on young women under the age of 19; however, this conceptual approach does not exclude women under age 19 who epidemiologically and/or clinically warrant the implementation of a Papanicolaou smear with the use of Friedell's "biologic age of the cervix" formula.

1686 RECHECKING SOME FACTORS IN GENITAL CANCER IN WOMEN. (Eng.) Vodopija, I.; Bagovic, P.; Bacic, M.; Ivic, T.; Bolanca, M.; Audy, S. In: *Host Environment Interactions in the Etiology of Cancer in Man. Proceedings of a Meeting Held at Primosten, Yugoslavia, 27 August-2 September 1972.* International Agency for Res. on Cancer and John E. Fogarty International Center of Natl. Insts. Health USA (Lyon, France): pp. 63-66; 1973.

An attempt was made to identify certain factors in the pathogenesis of cervical cancer in 170 cases. Of these, 111 were carcinoma in situ and 59 were invasive. The highest frequency of carcinoma in situ was in the age group 30-40 yr, and the highest frequency for invasive cancer was in the 50-54 age group. Attempts to correlate factors such as professional status, work load, night shifts, infections, number of births, number of abortions, and eye color were also made.

1687 RECENT TRENDS IN BREAST-CANCER INCIDENCE AND MORTALITY IN RELATION TO CHANGES IN POSSIBLE RISK FACTORS. (Eng.) Armstrong, B. (Radcliffe Infirmary, Oxford OX2 6HE, England). *Int J Cancer* 17(2): 204-211; 1976.

Breast cancer incidence and mortality in England and Wales and the United States increased between

1950 and 1973, primarily in women 45-64 yr of age. These increases appeared to be partly cohort-specific, beginning with cohorts born around 1899, and partly cross-sectional, beginning in the mid-1960s. In both countries, cohort-specific decreases in fertility paralleled the cohort-specific increases in breast cancer rates and may have been responsible for them. Changes in other factors, such as age at menarche and menopause, use of rauwolfia derivatives and estrogens, consumption of fat and meat, and breast cancer treatment were considered in relation to the cross-sectional increases in breast cancer rates. The evidence did not indicate that any of these could explain the breast cancer increases.

1688 WHO IS THE HIGH RISK PATIENT? (Eng.) Hammond, E. C. In: *Early Breast Cancer: Detection and Treatment.* Edited by H. S. Gallager. (New York: John Wiley & Sons): 113-116; 1975.

The current knowledge of breast cancer risk factors is discussed. The most important predictive factor is age, as cancer death occurs more often in older women. Deaths from breast cancer occur most often in white women from the northeastern states who have a family history of the disease. The correlation between family history and breast cancer is discussed at length; various explanations for the association are presented. Women with a prior breast injury or operation have increased rates of breast cancer, and death from the cancer is 40% higher in single women than in married women.

1689 A GENETICIST'S VIEW OF LUNG DISEASE. (Eng.) Kazazian, H. H., Jr. (Johns Hopkins Univ. Sch. Medicine, Baltimore, MD 21205). *Am Rev Respir Dis* 113(3): 261-266; 1976.

Both environmental and genetic factors contribute to the risk of lung disease. In one survey, the non-smoking relatives of lung cancer patients were found to have a similarly increased risk of lung cancer as smokers without any such family history of the disease; smokers with a family history of lung cancer had a risk that was greater than the sum of each of the individual risks. One component of the genetic element involved in determining susceptibility to lung cancer may be the inducibility of aryl hydrocarbon hydroxylase (AHH), an enzyme involved in the metabolism of carcinogens. The inducibility of this enzyme was low in 45% of normal individuals and subjects with tumors at other sites, but was low in only 4% of lung cancer victims. Furthermore, mice in which AHH is highly inducible are more susceptible than other mice to the induction of tumors by the subcutaneous administration of 3-methylcholanthrene. The inducibility of AHH, which appears to be under the control of a single gene in mice, may be one of the perhaps many inherited risk factors for bronchogenic carcinoma. Gradations of risk will be modulated by different genes acting in combination and by different environmental factors.

1690 GENETIC FACTORS IN BREAST CANCER. IDENTIFICATION OF A HIGH RISK GROUP BY MEANS OF DERMATOGLYPHIC INVESTIGATION. (Eng.) de Andres Basauri, L. (Hosp. de la Sta. Cruz y S. Pablo, Barcelona, Spain); Barneo, L.; Carulla, J. *Oncology* 32(1): 27-33; 1975.

The line patterns on the hands and fingers of a group of 92 Spanish women with proven mammary adenocarcinomas were compared to those of a control population to determine any possible correlations between the disease and particular genetically determined dermatoglyphic traits. The frequencies of the following traits were significantly different between the cancer and control groups: digital VV genotype, the association of terminal field 2 with left palmar line A, degree of asymmetry of the transversality index between each hand, and the median a-b ridge count. The results suggest that dermatoglyphic investigation may be used in screening campaigns to compute individual probabilities of contracting mammary cancers.

1691 INVESTIGATIONS ON THE CARCINOGENIC BURDEN BY AIR POLLUTION IN MAN. XIII. ASSESSMENT OF THE CONTRIBUTION OF PASSENGER CARS TO AIR POLLUTION BY CARCINOGENIC POLYCYCLIC HYDROCARBONS. (Eng.) Grimmer, G. (Biochemisches Institut fuer Umweltcarcinogene, D-207 Ahrensburg, Sieker Lanstr. 19, W. Germany); Hildebrandt, A. *Zentralbl Bakteriol* [*Orig B*] 161(2): 104-124; 1975.

A total of 100 passenger cars were tested with regard to the amount of polycyclic aromatic hydrocarbons (PAH) emitted during the EUROPA-Test (E.-Test, simulated city driving). As determined by frequency of registration, the 20 most common car models were chosen. Each model was represented by five cars. The total amount of selected 14 PAH emitted by all test vehicles during an E.-test was in the range of 1-16 mg. As can be seen from the average of fuel consumption (409.4 g/E.-test) and benzo(a)pyrene emission (41.6 micro-g/E.-test), 1,000 kg of burned fuel yield 101 mg of benzo(a)-pyrene. Based on the consumption of gasoline in 1973 in West Germany (18,508,200 tons), an annual amount of 1.85 tons of benzo(a)pyrene is produced by gas engine vehicles. However, the biological effect of the automobile exhaust is still larger because it contains additional carcinogenic PAH. A statistical evaluation of the results showed that different car models cannot be distinguished by their PAH emission.

1692 BLADDER CANCER IN RUBBER WORKERS: DO SCREENING AND DOCTORS' AWARENESS DISTORT THE STATISTICS? (Eng.) Fox, A. J. (Office Population Censuses and Surveys, Medical Statistics Div., St. Catherine's House, Kingsway, London WC2B 6JP, England); White, G. C. *Lancet* 1(7967): 1009-1011; 1976.

Twenty-seven rubber workers and 88 controls registered in 1966 and 1967 with bladder cancer were followed. Their death rates were compared with the relative frequency of bladder cancer recorded on the death certificates, in order to determine whether cytological screening or doctors' awareness might explain a recent rise in the bladder-cancer death rate in this industry. Since the proportions of rubber workers and controls who died before 1976 were similar (74% and 73%, respectively), and because bladder cancer was mentioned with similar frequency on their death certificates (80% and 83%, respectively), neither screening nor doctors' awareness appears to have an important influence.

1693 ANDROGENS AND AGE AT FIRST BIRTH IN RELATION TO RISK OF BREAST CANCER. (Eng.) Spicer, C. C. In: *Host Environment Interactions in the Etiology of Cancer in Man. Proceedings of a Meeting Held at Primosten, Yugoslavia, 27 August-2 September 1972.* International Agency for Res. on Cancer and John E. Fogarty International Center of Natl. Insts. Health USA. (Lyon, France): pp. 159-162; 1973.

The ratio of androgenic to corticoid hormones and the age at first birth were investigated with respect to their relation to the risk of breast cancer. This is a continuation of a previously reported survey, and there has been no change in the reported findings. Women who developed breast cancer had lower androgen excretion than controls up to 10 yr before the clinical disease occurred, and no differences in corticoid excretion were apparent. When previously reported data on androgen excretion were reexamined, the risk in those women who had low etiocholanolone levels and late first-born children was conspicuously higher than that for any category in which these two factors were not present simultaneously. The results suggest that both androgens and age at first birth influence the risk of breast cancer, but that either can compensate for the effects of the other.

1694 DETECTION OF BREAST DISEASE IN A FAMILY PLANNING ASSOCIATION CLINIC. (Eng.) Hamilton, T. (Univ. Edinburgh, Dept. Clinical Surgery, The Royal Infirmary, Edinburgh EH3 9YW, Scotland); Loudon, N. B.; Prescott, R. J.; Rankin, M. E. *Scott Med J* 21(11): 31-36; 1976.

1695 CHANGING EPIDEMIOLOGY OF LUNG CANCER: INCREASING INCIDENCE IN WOMEN. (Eng.) Beamis, J. F., Jr. (Lahey Clinic Foundation, 605 Commonwealth Ave., Boston, MA 02215); Stein, A.; Andrews, J. L., Jr. *Med Clinic North Am* 59(2): 315-325; 1975.

1696 THE PREVALENCE OF OCCULT PAPILLARY THYROID CARCINOMA IN 100 CONSECUTIVE AUTOPSIES IN AN AMERICAN POPULATION (Abstract). (Eng.) Ludwig, G. (Univ. of Michigan Sch. of Medicine, Ann Arbor, MI 48104); Nishiyama, R. H. *Lab Invest* 34(3): 324-325; 1976.

1697 EPIDERMOID CARCINOMA OF THE BULBAR CONJUNCTIVA IN ETHIOPIA. (Eng.) Judge, D. M. (Milton S. Hershey Medical Center, Pennsylvania State Univ. Coll. Medicine, Hershey, PA 17033); Samuel, I. *Cancer* 37(2): 913-916; 1976.

1698 SECOND NEOPLASMS WITH CHRONIC LYMPHOCYTIC LEUKEMIA. (Eng.) Moayeri, H. (Roswell Park Memorial Inst., Buffalo, NY); Han, T.; Stutzman, L.; Sokal, J. E. *NY State J Med* 76(3): 378-381,449; 1976.

1699 THE EFFECT OF AN ASYNCHRONOUS POPULATION OF CELLS ON THE INITIAL SLOPE OF DOSE-EFFECT CURVES. (Eng.) Chadwick, K. H.; Leenhouts, H. P. In: *Cell Survival after Low Doses of Radiation: Theoretical and Clinical Implications.* Edited by T. Alper. Institute of Physics. (London, England): 57-63; 1974.

1700 EPIDEMIOLOGY IN CANCER OF THE INDIAN SUBCONTINENT. SERIES VIII. (Eng.) Jussawalla, D. J. (Tata Memorial Center, Parel, Bombay-400012, India); Gangadharan, P. *Indian J Cancer* 12(4): 1-10; 1975.

1701 MORTALITY FROM CANCER OF THE UTERUS IN CANADA AND ITS RELATIONSHIP TO SCREENING FOR CANCER OF THE CERVIX. (Eng.) Miller, A. B. (Natl. Cancer Inst. Canada, Toronto, Canada); Lindsay, J.; Hill, G. B. *Int J Cancer* 17(5): 602-612; 1976.

1702 A CLINICAL STUDY OF SKIN CANCER: GENETIC AND ENVIRONMENTAL INTERACTIONS. (Eng.) Smithurst, B. A. (Medical Sch., Herston Road, Herston, Queensland, Australia 4006); Silverstone, H. *Public Health* 90(1): 25-30; 1975.

1703 EPIDEMIOLOGICAL STUDIES OF PVC MANUFACTURERS AND FABRICATORS, AND PRIMARY ANGIOSARCOMA OF THE LIVER. (Eng.) Baxter, P. J. (Employment Medical Advisory Service, Baynards House, 1 Chepstow Place, London W2 4TF, England). *Proc R Soc Med* 69(4): 297-299; 1976.

1704 THE INCIDENCE OF SPONTANEOUS TUMORS OF THE CENTRAL NERVOUS SYSTEM OF WISTAR RATS. (Eng.) Sumi, N. (Inst. fuer Toxikologie, E. Merck, D-6100 Darmstadt, Postfach 4119, Frankfurter Str. 250, W. Germany); Stavrou, D.; Frohberg, H.; Jochmann, G. *Arch Toxicol (Berl)* 35(1): 1-13; 1976.

1705 A FIVE-YEAR CUMULATIVE SURVEY OF CASES OF LEUKAEMIA AND MYELOMATOSIS IN THE SOUTH-EAST OF SCOTLAND. (Eng.) Ramsay, D. M. (The Royal Infirmary, Edinburgh, Scotland). *Health Bull (Edinb)* 33(4): 158-165; 1976.

1706 INCIDENCE OF AFLATOXIN IN CORN AND A FIELD METHOD FOR AFLATOXIN ANALYSIS. (Eng.) Hunt, W. H. (Grain Div., AMS, U.S. Dept. Agriculture, Hyattsville, MD 20782); Semper, R. C.; Liebe, E. B. *Cereal Chem* 53(2): 227-232; 1976.

See also:

* (Rev): 1201, 1202, 1209, 1210, 1211, 1235, 1243, 1245, 1247, 1252
* (Chem): 1298, 1317, 1319, 1320, 1321, 1322, 1323, 1324, 1325, 1326, 1327, 1328, 1342, 1347, 1350, 1356
* (Phys): 1371, 1375, 1377
* (Viral): 1416, 1442, 1468
* (Path): 1556, 1570, 1588, 1595, 1605, 1608, 1625, 1631, 1635, 1636, 1649

1707 THE HIGH MOLECULAR WEIGHT PROTEINS RELEASED FROM CULTURED CELLS. (Eng.) Harris, J. R. (Dept. Biological Science, North-East London Polytechnic, Romford Rd., London E15 4LZ, U.K.); Brown, K. D.; Aiton, J. F. *Biochim Biophys Acta* 427(2): 727-737; 1976.

Studies were performed with the serum-free culture medium taken from several fibroblast monolayer culture lines. A high molecular weight protein fraction was separated from the concentrated medium by sucrose density gradient centrifugation. Polyacrylamide gel electrophoresis was used to assess the degree of purification obtained. By use of the electron microscope, the negatively stained high molecular weight proteins were found to closely resemble the α_2-macroglobulins. The suggestion that these proteins from cultured cells resemble the cylindrical protein complex isolated from mammalian RBC ghosts is not supported by this study. The results are discussed in the light of the extensive literature now available on the electron microscopic observations of high molecular weight proteins.

1708 REVERSIBLE IN VITRO POLYMERIZATION OF TUBULIN FROM A CULTURED CELL LINE (RAT GLIAL CELL CLONE C_6). (Eng.) Wiche, G. (Dept. Biochemistry, Univ. California, Berkeley, CA 94720); Cole, R. D. *Proc Natl Acad Sci USA* 73(4): 1227-1231; 1976.

Tubulin from cultures of the rat glial cell clone C_6 were polymerized in vitro into intact microtubules. The polymerization was reversible and spontaneous, i.e., no addition of heterologous nucleation centers was necessary. Two cycles of polymerization/depolymerization yielded tubulin preparations of 95% purity as determined by sodium dodecyl sulfate-polyacrylamide gel electrophoresis. Electron microscopy showed that the microtubules assembled in vitro by two cycles of polymerization/depolymerization were morphologically intact and temperature sensitive. In contrast, tubulin from neuroblastoma cells, clone Neuro-2A, could not be polymerized in a reversible fashion. The discovery of a cell line from which tubulin can be reversibly polymerized in vitro establishes a model system for studies of cell-cycle- and cell-type-dependent regulatory mechanisms controlling the assembly of microtubules.

1709 DEGRADATION OF ABNORMAL PROTEINS IN HELA CELLS. (Eng.) Hendil, K. A. (August Krogh Institute, Univ. Copenhagen, 13, Universitetsparken, DK 2100, Copenhagen 0, Denmark). *J Cell Physiol* 87(3): 289-296; 1976.

An investigation has been made of the effects of agents such as puromycin, fluorouracil, and amino acid analogs, all of which induce the synthesis of abnormal proteins but by different mechanisms, on protein degradation in nearly-confluent monolayer cultures of HeLa cells. The degradation of the fragmentary proteins synthesized in the presence of 20 μg/ml of puromycin, monitored by increasing solubility in trichloroacetic acid after labeling with ^{3}H-leucine, was much more rapid than the degradation of normal proteins made in untreated cells. The increased breakdown was almost unaffected by 20 μg/ml of cycloheximide, and was independent of pH between 7 and 8. SDS-electrophoresis demonstrated that the fragmentary proteins with the lower molecular weights were the least stable. Proteins made in the presence of the amino acid analogs, p-fluorophenyl alanine and canavanine, were also markedly less stable than normal proteins; those made after pretreatment of the cells for 24 hr with 2.5 μg/ml of 5-fluorouracil were slightly less stable. The results support the theory that a proteolytic scavenger system which preferentially degrades abnormal proteins exists in eukaryotic cells as well as in bacteria.

1710 ADAPTIVE ENHANCEMENT OF AMINO ACID TRANSPORT IN HUMAN LEUKEMIC LEUKOCYTES: STUDIES WITH ALPHA-AMINOISOBUTYRIC ACID. (Eng.) Frengley, P. A. (Univ. Rochester Sch. Medicine, 601 Elmwood Ave., Rochester, N.Y. 14642); Lichtman, M. A.; Peck, W. A. *J Lab Clin Med* 86(6): 984-996; 1975.

The initial rates of accumulation of [3-^{14}C] alpha-aminoisobutyric acid (AIB) by human leukemic WBC increased markedly and progressively during 240 min incubations in amino acid-deficient media. Absolute increments were greater in blast cells from patients with acute lymphoblastic leukemia and with acute myeloblastic leukemia than in lymphocytes from patients with chronic lymphocytic leukemia. Time-related increases appeared to be restricted to an active mechanism for AIB entry and could not be attributed to cell damage, alterations in the incubation media, or progressive reduction in transinhibition of AIB entry. Studies with two cell populations revealed these increases to be associated with an augmented V_{max} and a reduction in apparent K_m. Time-related increases failed to develop in two chronic lymphocytic leukemia lymphocyte populations and were partially reduced in two leukemic blast cell populations during continuous exposure to high extracellular AIB concentrations. This phenomenon could represent an adaptive response to environmental amino acid deprivation.

1711 CELL SURFACE PROTEIN PARTIALLY RESTORES MORPHOLOGY, ADHESIVENESS, AND CONTACT INHIBITION OF MOVEMENT TO TRANSFORMED FIBROBLASTS. (Eng.) Yamada, K. M. (Natl. Cancer Inst., Natl. Insts. Health, Bethesda, MD 20014); Yamada, S. S.; Pastan, I. *Proc Natl Acad Sci USA* 73(4): 1217-1221; 1976.

The major cell surface glycoprotein of chick embryo fibroblasts, CSP, was isolated and added to a variety of transformed cells in vitro. The transformed cells became more elongated, often more flattened, and showed increased adhesion to the substratum. Several transformed cell lines also aligned in striking parallel arrays. This alignment was characterized by a decrease in the amount of nuclear overlapping, probably indicating restoration of contact inhibition of movement. The morphological changes were antagonized by antibody to CSP. These effects of CSP were associated with an elevation of cellular 3':5' cyclic AMP. Moreover, the morphological reversion was not accompanied by an alteration in growth properties. These results are consistent with a role for CSP in cell adhesion and morphology but not in growth control.

1712 PHYSICAL STUDIES ON GLYCOPROTEINS FROM ASCITIC FLUID OF EHRLICH ASCITES TUMOR.

(Eng.) Reznick, A. Z. (Dept. Biology, Technion-Israel Inst. Technology, Haifa, Israel); Winzler, R. J. *Biochim Biophys Acta* 428(2): 441-444; 1976.

Several physical parameters of three glycoproteins previously separated from $HClO_4$-soluble fraction of ascitic fluid of Ehrlich ascites tumor are described. The glycoproteins are designated according to their electrophoretic mobility as the fast (F), middle (M), and slow (S) moving glycoproteins. Molecular weights obtained by osmotic pressure, sedimentation equilibrium, and sedimentation diffusion methods were similar (ranging between 44,300 and 46,100 for F; 75,400-77,500 for M; and 79,700-83,200 for S), while gel filtration yielded higher values (55,400, 78,000, and 90,000 for F, M, and S, respectively). Sedimentation coefficients, partial specific volumes, sedimentation velocity, diffusion coefficients, Stoke's radii, and frictional ratios of the three glycoproteins were compared with those previously reported for orosomucoid and haptoglobin from human plasma. The physical parameters of F and S glycoproteins resembled the data reported for the orosomucoid and haptoglobin, respectively. The properties of M glycoprotein could not be associated with a known glycoprotein.

1713 DISTRIBUTION AND NATURE OF SACCHARIDES OF PLASMA MEMBRANES OF RAT ASCITES HEPATOMA CELLS AS DETECTED BY FERRITIN-CONJUGATED LECTINS AND DIALYSED IRON.

(Eng.) Shimizu, S. (Aichi Cancer Center Res. Inst., Nagoya, Japan); Yamada, K. *Exp Cell Res* 97(2): 322-328; 1976.

Electron microscopic cytochemical studies were made on saccharides involved in the plasma membranes of rat ascites hepatoma cells (AH7974F) using ferritin-conjugated lectins and dialysed iron (DI). In the rat hepatoma cells, saccharide receptors for each of the three lectins used (concanavalin A (Con A), wheat germ agglutinin (WGA) and Ricinus communis agglutinin (RCA)) were shown to be distributed homogeneously throughout the plasma membranes. When the cells were agglutinated, however, the saccharide receptors for each lectin appeared to form clusters on the plasma membranes. The cluster formation induced by one lectin was found to lead to a changed distribution of saccharide receptors for another lectin. None of the cluster formation types induced by lectins yield any noticeable effects upon the distribution of DI reactive acidic saccharides on the plasma membranes.

1714 MUCIN HISTOCHEMISTRY OF HUMAN CHOLANGIOCARCINOMA.

(Eng.) Chou, S. T. (Univ. Hong Kong, Queen Mary Hosp., Hong Kong, China); Chan, C. W.; Ng, W. L. *J Pathol* 118(3): 165-170, 1976.

Histochemical studies of mucins were carried out on 17 autopsy specimens of cholangiocarcinomas associated with clonorchiasis. An alcian blue-PAS method was used to distinguish neutral and acid mucins, and the high iron diamine-alcian blue (HID-AB) sequence was used to demonstrate acid mucins and distinguish sulfomucins. All tumors produced epithelial mucins that were mixtures of neutral and acid mucopolysaccharides without any histochemically demonstrable components of sialic acid and uronic acid. The mucins were qualitatively similar to that secreted by normal and *Clonorchis*-infested bile ducts. However, carboxymucins were reduced and sulfomucins were absent or present only in trace amounts in the neoplastic epithelium; in the hyperplastic epithelium in clonorochiasis, sulfomucins were abundant. The HID-AB technique for sulfomucins is valuable in differentiating hyperplastic bile ducts and cholangiocarcinoma.

1715 LOCALIZATION OF α-FETOPROTEIN IN LIVER TISSUE OF RATS DURING POSTNATAL DEVELOPMENT: COMPARISON OF THE IMMUNOFLUORESCENT AND AUTORADIOGRAPHIC METHODS.

(Eng.) Stratil, P. (Cancer Inst., 602 00 Brno, Zluty kopec 7, Czechoslovakia); Dolezalova, V.; Feit, J.; Kocent, A. *Neoplasma* 23(1): 1-10; 1976.

The localization of α-fetoprotein was studied in the liver of Wistar rats from birth up to the 37th day of life by immunofluorescence and autoradiography. The former has shown α-fetoprotein to be localized in hepatocytes and the number of positive hepatocytes to decline proportionally with that of α-fetoprotein concentration in the serum. In newborn rats almost all hepatocytes were positive. Throughout the subsequent development of the liver tissue, the number of positive hepatocytes decreased; at the time of the formation of the lobular structure, only certain groups of lobes remained positive. The number of positive cells gradually diminished from the periphery toward the central vein. The autoradiographic method revealed only small groups of individual cells to be α-fetoprotein positive, without any specific localization.

1716 SYNTHESIS AND TURNOVER OF PLASMA-MEMBRANE PROTEINS AND GLYCOPROTEINS IN A NEUROBLASTOMA CELL LINE.

(Eng.) Mathews, R. A. (Veterans Admin. Hosp., Sepulveda, CA 91343); Johnson, T. C.; Hudson, J. E. *Biochem J* 154(1): 57-64; 1976.

A kinetic analysis of the appearance of ^{14}C-labeled proteins in the surface membranes isolated from exponentially growing neuroblastoma cells (N2a) showed that the total membrane proteins reached a steady-state specific radioactivity in 18-20 hr. However, examination of individual protein bands resolved by sodium dodecyl sulfate-urea-polyacrylamide-gel electrophoresis illustrated that differences in the kinetics of specific surface-membrane proteins could be detected. Although most of the protein bands reached a steady-state specific radioactivity at a time similar to that for total membrane proteins, at least two bands (molecular wt 180,000 and 130,000) attained the steady-state within 8-10 hr. It was shown by the use of dual-labeling techniques that these two protein bands turned over in the surface membranes of neuroblastoma N2a cells at least 180% and 150% faster than the total membrane protein, but together they compose only a small fraction of the total membrane protein. These two proteins were glycosylated and located on the outer surface of the cells, since they were labeled with radioactive carbohydrates and readily removed by treatment of the intact neuroblastoma cell with proteinases. These results show that discrete components of the cell membrane are assembled at different rates.

1717 CHROMATIN PROTEINS: ELECTROPHORETIC, IMMUNOLOGICAL AND METABOLIC CHARACTERISTICS. (Eng.) Busch, H.; Ballal, R.; Busch, R. K.; Ezrailson, E.; Goldknopf, I. L.; Olson, M. O. J.; Prestayko, A. W.; Taylor, C. W.; Yeoman, L. C. In: *Chromosomal Proteins and Their Role in the Regulation of Gene Expression*. Edited by G. S. Stein; L. J. Kleinsmith. (New York: Academic Press, Inc.): 187-211; 1975.

Two-dimensional polyacrylamide gel electrophoresis showed that in nuclei of Novikoff hepatoma ascites cells there are approximately 75 proteins in the chromatin fraction soluble in 3 M NaCl-7 M urea. Dialysis of this fraction to an ionic strength of 0.14 produced a soluble fraction and a precipitate. Antibodies to the soluble fraction distributed diffusely throughout the nucleus and antibodies to the precipitate localized primarily in the nucleolus and the nuclear ribonucleoprotein network. Autoradiography of dried two-dimensional gels after labeling of the nuclear proteins in vivo with ^{3}H-L-leucine demonstrated that of the major proteins in the soluble fraction, proteins C6, C14 and C13 were most highly labeled. The nucleolar proteins differed from the extranucleolar in antigenicity and labeling patterns.

1718 INHIBITION OF TRANSCRIPTION IN VITRO BY A NON-HISTONE PROTEIN ISOLATED FROM EHRLICH ASCITES TUMOR CHROMATIN. (Eng.) Kostraba, N. C. (Div. Cell and Molecular Biology, State Univ. New York Buffalo, Buffalo, N.Y. 14214); Wang, T. Y. *J Biol Chem* 250(23): 8938-8942; 1975.

A non-histone protein was isolated from Ehrlich ascites tumor chromatin. The minimum molecular weight of this non-histone protein (estimated by sodium dodecyl sulfate gel electrophoresis and amino acid analysis) was approximately 11,000. This non-histone protein was acidic, contained 2.7% alkali-labile phorphorus, bound to DNA, and inhibited transcription of DNA in vitro by the homologous RNA polymerase. The per cent inhibition of RNA synthesis was not affected by increasing amounts of RNA polymerase, but was reduced by addition of excess DNA. In the presence of the non-histone protein, incorporation of [gamma-^{32}P]ATP and [gamma-^{32}P]GTP into RNA in the in vitro RNA synthesizing system was inhibited (with no apparent change in the average chain length of the RNA product). Inhibition of RNA synthesis was completely eliminated if the DNA template was allowed to interact with ATP prior to the addition of the non-histone protein. The observed repression of in vitro RNA synthesis was thought to be due to the effect of the non-histone protein on the DNA.

1719 THE TOPOGRAPHICAL ORDER OF 18 S AND 20 S RIBOSOMAL RIBONUCLEIC ACIDS WITHIN THE 45 S PRECURSOR MOLECULE. (Eng.) Liau, M. C. (Univ. Texas System Cancer Center, Houston, Tex. 77025); Hulbert, R. B. *J Mol Biol* 98(2): 321-332; 1975.

Nucleoli (isolated from the Novikoff rat tumor) were used to study the biosynthesis and methylation of ribosomal RNA in vitro. Nucleolar nascent preribosomal RNA was labeled in limited regions with methyl-^{3}H groups by incubation of nucleoli with S-adenosyl-L-[methyl-^{3}H]methionine (under conditions that minimized degradation and further elongation of the RNA chains). The labeled nucleolar RNA was subsequently extracted by phenol treatment and fractionated by sucrose gradient centrifugation into 0 to 20 S, 20 to 30 S, and 30 to 50 S fractions. This produced an analogous effect of dividing the 45 S preribosomal RNA into 3 regions, the first region represented 17% of the 45 S RNA from the 5'-end (0 to 20 S), the second region 31% of the 45 S RNA from the middle segment (20 to 30 S), and the third region 52% of the 45 S RNA from the 3'-end (30 to 50 S). The methylated nucleotide patterns (both base and ribose) of these fractions were analyzed and compared with the patterns of the ribosomal RNAs. The ribose methylation patterns of the 0 to 20 S fraction resembled more closely those of 18 S ribosomal RNA; the ribose methylation patterns of the 30 to 50 S fraction resembled more closely those of 28 S ribosomal RNA. The 18 S ribosomal RNA was located nearer to the 5'-end and 28 S ribosomal RNA nearer to the 3'-end of the 45 S preribosomal RNA.

1720 EVIDENCE FOR AN ASSOCIATION OF MOST NUCLEAR RNA WITH CHROMATIN. (Eng.) Kimmel, C. B. (Dept. Biology, Univ. Oregon, Eugene, OR 97403); Sessions, S. K.; MacLeod, M. C. *J Mol Biol* 102(2): 177-191; 1976.

Chromatin prepared from mouse myeloma cell nuclei under conditions of low ionic strength and with minimal shearing was found to contain at least 80% of the nuclear RNA labeled during a 5 or 30 min pulse with uridine, or with a 5 minute pulse followed by a 25 min chase. The RNA remained associated with chromatin after shearing by sonication, as determined by sedimentation and equilibrium density-gradient analyses. It was released from chromatin by procedures which extract ribonucleoprotein particles from intact nuclei. These results, and the results of reconstruction experiments, suggest that this association reflects the in vivo location of nuclear RNA and is not the result of nonspecific binding during preparation. The chromatin-associated RNA includes RNA species which are known to be post-transcriptional: 32S precursor ribosomal RNA and polyadenylate containing heterogenous nuclear RNA. Fractions of chromatin enriched in associated RNA were obtained by two methods developed elsewhere, and in both of these the enrichment obtained (3- to 10-fold) appeared to be independent of the age of the RNA. The implications of these results for models fo RNA processing are discussed.

1721 POLYADENYLATION OF 35S RNA IN VITRO BY A CYTOPLASMIC PARTICULATE FRACTION FROM MOUSE MYELOMA. (Eng.) Wong-Staal, F. (Natl. Cancer Inst., Bethesda, MD 20014); Saxinger, W. C.; Gallo, R. C.; Gillespie, D. H. *Biochem Biophys Res Commun* 69(3): 599-607; 1976.

An ATP-incorporating activity was found to be associated with cytoplasmic particulate fractions prepared from mouse plasmacytoma MOPC-104E. The product was shown to be polyadenylate [poly(A)] by its chromatography pattern on oligo(dT) cellulose columns, and the endogenous primers included a 35S RNA species as analyzed by Cs_2SO_4 density centrifugation and polyacrylamide gel electrophoresis. The labeled poly(A) was estimated by gel electrophoresis to have a chain length of 200 nucleotides, and hydrolysis of the poly(A) yielded approximately 100 AMP residues for every adenosine residue.

1722 SOME PROPERTIES OF THE SMALL HOMODISPERSE RNAs IN THE CYTOPLASM OF HELA CELLS. (Eng.) Eliceiri, G. L. (St. Louis Univ. Sch. Medicine, St. Louis, MO 63104). *Biochim Biophys Acta* 425(2): 202-207; 1975.

Two homodisperse, methylated, small molecular weight RNAs, that have been previously described in HeLa cells and that are apparently coded by the nuclear genome, appear in the cytoplasm shortly after transcription, and possess a half-life of a few minutes. Under the denaturing conditions of urea-polyacrylamide gel electrophoresis, the migration of these RNAs indicated nucleotide lengths around 190 (A) and 160 (B). Neither A nor B RNAs differed in their electrophoretic mobility when in comparison of samples from 10 to 120 min incubation with $[^3H]$uridine. When the detergent-treated postmitochondrial fraction from cells incubated for 60 min with $[^3H]$uridine was centrifuged through a 0.3 M NaCl/0.5 M sucrose cushion, the resulting pellet showed a marked increase in the ratio of counts A/4 S RNA, and particularly B/4 S RNA, suggesting that they might not exist free in the cytoplasm. At low concentrations of camptothecin (1-2.5 μg/ml), the accumulation of A and B RNA was greatly suppressed, while the synthesis of 4 S and 5 S RNA was less affected. Their accumulation (particularly that of B RNA) was enhanced when cells were exposed to inhibitors of various steps of protein synthesis (puromycin, cycloheximide, pactamycin, emetine). Pulse-chase experiments with actinomycin D during suppression of protein synthesis indicated that, at least in the case of B RNA, this increased accumulation was partially due to a marked prolongation of its half-life. These two RNAs are probably either the hydrolyzed products of protein synthesis, or precursor molecules that have not yet achieved their ultimate function.

1723 EVIDENCE FOR THE EXISTENCE OF A STABLE ASSOCIATION BETWEEN NASCENT DNA AND THE NUCLEAR MEMBRANE OF HELA CELLS. (Eng.) Dye, D. M. (Dept. Biochemistry and Biophysics, Univ. California, Davis, CA 95616); Toliver, A. P. *Biochim Biophys Acta* 414(2): 173-184; 1975.

The nascent DNA-nuclear membrane complexes (isolated from HeLa cells and solubilized in a sodium dodecyl sulfate-urea solution) were examined by gel electrophoresis, column chromatography, isopycnic centrifugation, and extraction with chloroform/methanol. Radioactivity attributable to $[^3H]$DNA co-migrated with three protein peaks during electrophoresis. This radioactivity was eliminated by prior treatment with DNase. All of the radioactivity attributable to nascent DNA eluted with a specific protein on Sepharose 4B columns. This DNA protein complex banded at a density of 1.58 gm/cm^3 in sucrose-CsCl gradients. Treatment with DNase, phospholipase A and C, and dilute alkali disrupted the complex. Approximately 93% of the radioactivity attributable to protein and 70% of that attributable to DNA could be extracted from the complex with a chloroform/methanol solution. Nascent DNA could be in a stable association with a proteolipid moiety of the nuclear membrane.

1724 INDUCTION OF DNA SYNTHESIS AND CELL DIVISION IN HUMAN DIPLOID SKIN FIBROBLASTS BY FIBROBLAST GROWTH FACTOR. (Eng.) Kamely, D. (Imperial Cancer Res. Fund Lab., Lincoln's Inn Fields, London WC2A 3PX, England); Rudland, P. S. *Exp Cell Res* 97(1): 120-126; 1976.

The growth requirements of several normal diploid human skin fibroblasts in cell culture were investigated. The human diploid cells ceased growing, predominantly due to depletion of serum factors in the medium. Quiescent cultures could be reinitiated to synthesize DNA by the addition of the bovine pituitar factor, fibroblast growth factor (FGF). FGF at saturating concentrations (50 ng/ml) can initiate DNA synthesis in quiescent cultures at approximately 40% to 50% of the efficiency compared with 30% fetal calf serum. Hydrocortisone and insulin did not potentiate the action of FGF in completely quiescent cultures. In the absence of serum FGF, insulin and hydrocortisone failed to maintain continuous cell growth, suggesting the involvement of additional serum components. FGF failed to stimulate cells arrested by histidine deprivation. These results suggest that the mechanism by which FGF normally activates the events responsible for cell growth may be dependent upon a signal different from the increasing availability of essential nutrients in the cell.

1725 REVERSE TRANSCRIPTASE IN LEUKOCYTES OF LEUKEMIC PATIENTS IN REMISSION. (Eng.)

Viola, M. V. (Columbia Univ., 99 Fort Washington Ave., New York, NY 10032); Frazier, M.; Wiernik, P. H.; McCredie, K. B.; Spiegelman, S. *N Engl J Med* 294(2): 75-80; 1976.

A cytoplasmic particulate fraction from human leukemic cells has been shown to contain reverse transcriptase and its associated high-molecular-weight RNA template. An attempt to detect the reverse-transcriptase-template complex in morphologically normal peripheral blood leukocytes from patients with acute leukemia in complete remission was made. The assay system consisted of a velocity glycerol gradient and cesium sulfate equilibrium gradient analysis of the endogenous reverse transcriptase reaction product. Of the patients in remission, 3 of 9 had positive reactions determined by glycerol gradient analysis, and 8 of 10 patients had positive reactions by cesium sulfate gradient analysis. The template complex in leukocytes of normal persons was not detected. Thus, normal-appearing leukocytes in the peripheral blood of some leukemia patients in remission seem to retain a number of biochemical characteristics, possibly viral related, associated with leukemic cells. It is not known whether one or two white cell populations were operative in the remission patients.

1726 INDUCTION OF DNA POLYMERASE α DURING LIVER REGENERATION IN RATS ON CONTROLLED FEEDING SCHEDULES. (Eng.)

Davis, P. B. (Natl. Inst. Health, Bethesda, MD 20014); Laszlo, J.; Baril, E. F. *Cancer Res* 36(2): 432-437; 1976.

The activity of two nonmitochondrial forms of DNA polymerase, designated DNA polymerases alpha and beta, was investigated during liver regeneration in regimented rats. Regimentation with respect to temperature, light and darkness, and availability of food resolved the DNA synthesis response to partial hepatectomy into two peaks, one occurring at a fixed time after operation and the other entrained by the environmental conditions. The peaks could be fused or separated depending on the timing of the operation: operation times were selected to give both patterns. For both operation times, DNA polymerase activity in nuclear extract correlated temporally and qualitatively with radioactive thymidine uptake into DNA. DNA polymerase alpha represented 70% and DNA polymerase beta represented 30% of the recovered activity from the nuclear extract. For both operation times, DNA polymerase activity in the postmicrosomal fraction was sedimentable and increased 3-4 times above the level observed with the same fraction from normal rat liver. The DNA polymerase activity in the postmicrosomal pellet was shown to be DNA polymerase alpha due to its sedimentable nature and high molecular weight. DNA polymerase alpha activity with this fraction peaked 4-6 hr after the time of maximal radioactive thymidine incorporation into DNA. DNA polymerase activity in the microsome fraction did not change significantly after partial hepatectomy and was shown to represent DNA polymerase beta. Cycloheximide and actinomycin abolished the rise in DNA polymerase alpha activity in the nucleus and postmicrosomal fraction. Hydroxyurea did not prevent the rise in DNA polymerase alpha activity with those subcellular fractions, but did inhibit over 90% of the uptake of radioactive thymidine into DNA. The data suggest that DNA polymerase alpha activity is induced in response to the stimulus for liver regeneration.

1727 RIBONUCLEIC ACID-DEPENDENT RIBONUCLEIC ACID POLYMERASE IN THE IMMUNE RESPONSE.

(Eng.) Saito, K. (Sch. Medicine, Gunma Univ., 3-39-22 Showa-machi, Maebashi 371, Japan); Mitsuhashi, S. *Jpn J Microbiol* 19(6): 433-439; 1975.

RNA-dependent RNA polymerase activity demonstrated in the microsomal and ribosomal fraction from the spleen cells of immunized C_3H mice was purified and characterized. The enzyme activity was solubilized by Triton X-100 from the fraction and partially purified by Biogel A 1.5 m column chromatography. The RNA-dependent RNA polymerase activity was eluted in a single peak from the column. High activity was demonstrated with an RNA preparation (iRNA) as a template made from the spleens of immunized mice but very low activity was found with an nRNA preparation made from the spleens of normal mice. Incorporation of ^{3}H-uridine triphosphate (^{3}H-UTP) markedly decreased in the presence of RNase but not in the presence of DNase. DNA preparations made from the spleens of immunized mice were inactive as template for this enzyme. The iRNA preparation was fractionated by sucrose density gradient centrifugation. A fraction corresponding to 12-13S was most active as a template. It was followed by a fraction corresponding to 6-7S. Sucrose gradient analysis of the ^{3}H-UTP-labeled product revealed a single peak with a sedimentation property indistinguishable from that of the iRNA fraction (6-7S) used as template. The enzyme reaction was optimum at pH 5-8.5, 37 C, with a divalent

1728 TERMINAL DEOXYNUCLEOTIDYL TRANSFERASE IN AKR LEUKEMIC CELLS AND LACK OF RELATION OF ENZYME ACTIVITY TO CELL CYCLE PHASE. (Eng.)

Harrison, T. A. (Center Cancer Res. and Dept. Biology, Massachusetts Inst. Technology, Cambridge, MA); Barr, R. D.; McCaffrey, R. P.; Sarna, G.; Silverstone, A. F.; Perry, S.; Baltimore, D. *Biochem Biophys Res Commun* 69(1): 63-67; 1976.

The specific activity of terminal deoxynucleotidyl transferase in leukemic cells as a function of cell cycle phase was determined using AKR leukemic cells separated according to their position in the cell cycle by velocity sedimentation through a sucrose gradient at unit gravity. The cell samples were independently homogenized, chromatographed on phosphocellulose, and assayed for terminal transferase. There was no relationship between terminal transferase activity per 10^8 cells and cell cycle phase. It seems unlikely that terminal transferase plays a role in normal DNA replication in cells that express this enzyme.

1729 TERMINAL DEOXYNUCLEOTIDYL TRANSFERASE ACTIVITIES IN HUMAN BLOOD LEUKOCYTES AND LYMPHOBLAST CELL LINES: HIGH LEVELS IN LYMPHOBLAST CELL LINES AND IN BLAST CELLS OF SOME PATIENTS WITH CHRONIC MYELOGENOUS LEUKEMIA IN ACUTE PHASE.

(Eng.) Sarin, P. S. (Building 37, Room 6B04, Natl. Cancer Inst., Bethesda, MD 20014); Anderson, P. N.; Gallo, R. C. *Blood* 47(1): 11-20; 1976.

The detection of terminal deoxynucleotidyl transferase in the WBC of four patients with chronic myelogenous leukemia (CML) in a blast phase is described and the levels with those present in cells from CML patients not in an acute blast phase, normal blood lymphocytes, B-cells, lymphoblast cell lines with T-cell characteristics, peripheral blood myeloblasts from patients with acute myelogenous leukemia, peripheral blood lymphocytes from patients with chronic lymphocytic leukemia (CLL), peripheral blood undifferentiated blasts from patients with undifferentiated leukemia, and normal thymus gland are compared. The observations that high levels are characteristic of the thymus gland with both human and calf tissue and that elevated levels may be found in some cases of acute lymphocytic leukemia were confirmed. High levels were also found in human lymphoblast cell lines with T-cell characteristics. Insignificant activity was observed in leukocytes of patients with CML that were not in the acute blast phase of the disease, CLL, human B cells, and normal human blood lymphocytes even after stimulation with phytohemagglutinin. However, high levels (approximately 200 nmoles/hr/10^9 cells) equivalent to those in thymus tissue and lymphoblast cell lines with T-cell characteristics were found in the peripheral blood blast cells of four patients with CML in an acute blast phase of their disease. These results suggest that terminal transferase is not specific for thymus cells or that in some acute blast phases of CML, undifferentiated lymphoblasts rather than myeloblasts may be the cells that proliferate.

1730 NUCLEOTIDASE ACTIVITY IN REGENERATING LIVER AND IN CLONAL STRAINS OF HEPATOMA AND PITUITARY CELLS IN CULTURE.

(Eng.) Tjernshaugen, H. (Inst. Medical Biochemistry, Univ. Oslo, Karl Johansgt. 47, Oslo 1, Norway); Gautvik, K. M. *J Cell Physiol* 88(1): 13-22; 1976.

A nucleotidase of the combined 3'- and 5'-type (nucleotide phosphohydrolase) was found to be present in the cytosol of regenerating male Wistar rat liver cells and of rat hepatoma and pituitary cells in culture. The enzyme activity per milligram of cell protein was very similar in regenerating liver and in three of the different cell types. The hepatoma cell strain that showed the slowest growth rate had a threefold higher basal enzyme activity. After the first days of regenerative growth in rat liver and during the early plateau phase of cell growth, there was a 50-120% increase in specific enzyme activity. In the hepatoma cells, the enzyme activities were also compared to the cellular content and synthesis of RNA and DNA. The increase in enzyme activity occurred concomitantly with a reduced incorporation of ^{3}H-thymidine into DNA. This high nucleotidase level may lower the concentrations of deoxyribonucleoside 5'-monophosphates. This would deplete the pools of deoxyribonucleoside triphosphates that are substrates for the DNA polymerase, thus retarding DNA synthesis.

1731 ADENOSINE DEAMINASE LEVELS IN BLOOD TYPE A PATIENTS WITH METASTATIC TUMOR.

(Eng.) Formeister, J. F. (Roswell Park Memorial Inst., Buffalo, NY 14203); Tritsch, G. L. *Surgery* 79(1): 111-117; 1976.

A lack of adenosine deaminase activity has been associated with severe combined immunodeficiency and decreased enzyme activity observed in acute lymphocytic leukemia. Enzyme activity in lymphocytes, red blood cells, and plasma of patients with a variety of metastatic tumors have been measured. Patients with tumor had a significantly lower erythrocyte adenosine deaminase activity ($p < 0.025$) and statistically higher enzyme activity in their lymphocytes ($p < 0.010$) when compared with control plasmaphoresis donors. Interestingly, blood type A tumor patients showed a significant decrease in their erythrocyte enzyme concentration compared with blood group A controls ($p < 0.001$) as well as a collective group of type B and O tumor patients ($p < 0.001$). Type A patient lymphocyte adenosine deaminase activity was not increased and was not statistically different from control group A donors. These results suggest that type A patients may be more overwhelmed immunologically than patients from other blood groups and that they warrant a more rigorous chemo- and immunotherapeutic approach after curative surgery. Tumor patients with blood groups B and O, considered collectively, had a statistically significant increase in their lymphocyte enzyme concentration compared with group B and O controls ($p < 0.001$).

1732 TRANSFORMATION OF HUMAN PERIPHERAL LYMPHOCYTES BY GALACTOSE OXIDASE.

(Eng.) Dixon, J. F. P. (Univ. Southern California Sch. Medicine, Los Angeles, CA 90033); Parker, J. W.; O'Brien, R. L. *J Immunol* 116(3): 575-578; 1976.

The optimal conditions for the transformation of human peripheral lymphocytes in response to galactose oxidase were investigated. An optimum concentration of galactose oxidase of 4-16 U/ml alone produced transformation. Prior treatment with neuraminidase (20 U/ml) enhanced this effect. The aldehyde blocking agents thiocarbohydrazide, hydroxylamine, dimedone, and sodium borohydride blocked transformation when they followed, but not when they preceded, galactose oxidase treatment. (Optimal concentrations were 0.5, 2, 8, and 8, respectively.) Thus, as is the case for periodate-induced lymphocyte transformation, the formation of free aldehyde at the cell surface would seem to be a critical event in the triggering of transformation by this agent. The degree of transformation was found to be highly variable in a group of normal donors, and also for the same donor at different times. However, the lymphocytes of some people gave a consistently poor response to galactose oxidase. Similar results have been obtained from previous studies of periodate-induced transformation of human lymphocytes.

1733 CHARACTERIZATION OF MICROSOMAL METHYL STEROL DEMETHYLASE IN TWO MORRIS HEPATOMAS. (Eng.) Williams, M. T. (Section Biochemistry, Cornell Univ., Savage Hall, Ithaca, NY 14853); Gaylor, J. L.; Morris, H. P. *Cancer Res* 36(2): 291-297; 1976.

The activity of methyl sterol demethylase, a multienzyme complex of cholesterol biosynthesis in which electron transport elements are involved, has been determined in microsomes from Morris hepatoma 7777 and hepatoma 5123C tissues and from the corresponding normal regions of the livers of host Buffalo rats. Whereas the specific activities of the demethylase in the tumor-derived microsomes were much less than in the microsomes of the surrounding host livers when measured in 0.1 M phosphate buffer, they were comparable when measured in 0.1 M pyrophosphate buffer (both at pH 7.4). The effect of pyrophosphate did not appear to be related to the chelation of Ca^{2+} or to an effect on the microsomal reductase or cytochrome redox components. When phenobarbital or 3-methylcholanthrene was administered to rats prior to the preparation of microsomes, levels of demethylase were elevated in normal and host liver tissues, but not in hepatoma 7777 or 5123C tissues. Phenobarbital uptake by these hepatomas has been reported; the lack of stimulation in the tumor tissues derives from some alteration in the regulation of induction of demethylase and not from lack of penetration of the inducing agents. A diet containing 3% cholestyramine given for 10 days also failed to induce demethylase in the tumor, but not control, tissues. It is concluded that the microsomal enzymic process of methyl sterol demethylation is grossly similar in normal liver and hepatomas 7777 and 5123C, but that the regulation of the enzyme is altered in the tumors.

1734 CHANGES IN ORNITHINE DECARBOXYLASE ACTIVITY IN NORMAL TISSUES OF TUMOR-BEARING MICE DURING TUMOR GROWTH. (Eng.) Noguchi, T. (Osaka Univ., Medical Sch., Kita-ku, Osaka, Osaka 530, Japan); Kashiwagi, A.; Tanaka, T. *J Biochem (Tokyo)* 79(2): 451-454; 1976.

The ornithine decarboxylase activities in the liver and spleen of tumor-bearing male ICR mice increased, reaching a peak 4 to 6 days after inoculation of tumor cells. The enzyme activity in the kidney, however, decreased during tumor growth and almost disappeared on day 6. Injection of cell-free tumor homogenate raised the enzyme activities in the liver and spleen, but did not change the activity in the kidney. No increase in enzyme activity in the liver of mice was observed on injection of homogenates of normal tissues, such as liver, spleen, kidney, and muscle. Similar increases in enzyme activity were observed in the livers of normal mice injected with cell-free ascites fluid or plasma obtained from tumor-bearing mice. The factor responsible for this increase in activity is apparently a nondialyzable heat-labile substance. As liver enzyme activity increased after tumor extract injection in hypophysectomized and adrenalectomized mice, it is unlikely that these endocrine systems are involved in enzyme activity increase in tumor-bearing animals.

1735 γ-GLUTAMYL TRANSPEPTIDASE IN HUMAN NEPHROBLASTOMA GROWN IN NUDE MICE. (Eng.) Wise, K. S. (Inst. Medical Microbiology, Gloriastrasse 19, Univ. Zurich, CH-8006 Zurich, Switzerland); Muller, E. *Experientia* 32(3): 294-296; 1976.

The growth of a transplantable tumor derived from a human nephroblastoma line was followed, and its gamma-glutamyl transpeptidase (GGTP) activity was studied in vivo and in vitro. The cultured cells were inoculated sc in male mice carrying the *nu/nu* homozygous genotype on a mixed BALB/c and A2G genetic background. Five of seven mice developed tumors by 3 wk; the other two never developed tumors. The tumors had multiple encapsulated lobes with central necrosis and peripheral vascularization. There was no evidence of invasiveness or metastases. Tumor cells were recognizable as the original cell line. Remarkably dense deposits of GGTP reaction product were found on monolayer cultures and in sections and imprints of the tumors. High levels of the enzyme occurred in the cultured cells and in the tumor cells. The serum level of GGTP in tumor-bearing mice was much higher than that in control mice, and the level in the tumor-bearing mice returned to normal after surgical resection. These findings suggest that serum GGTP originated in the tumor.

1736 AN IN VITRO PRODUCTION OF BONE SPECIFIC ALKALINE PHOSPHATASE. (Eng.) Singh, I. (Medical Coll. Ohio, Toledo, Ohio 43614); Tsang, K. Y. *Exp Cell Res* 95(2): 347-358; 1975.

Induced alkaline phosphatase was extracted from osteosarcoma cells (grown in tissue culture medium). The extracted enzyme was purified. With the use of electrophoresis, inhibition studies, and thermolability, the enzyme was categorized as alkaline phosphatase of osseous origin. Antibodies to this enzyme were reacted against alkaline phosphatase extracted from cadaveric bone, liver, intestine, kidney, and fresh placenta. The antibodies were specific against alkaline phosphatase of osseous origin. No cross-reaction occurred with the enzyme extracted from other sources. The data indicated that alkaline phosphatase of bone was a specific enzyme of osseous tissue. The enzyme had specific antigenic and other properties that distinguished it from alkaline phosphatases from other sources.

1737 ACTIVITY OF ACID PHOSPHATASE IN GLIAL TUMOR CULTURES.

(Rus.) Semenova, V. M. (Kiev Scientific Res. Inst. Neurosurgery, Kiev, USSR). *Vopr Neirokhir* (3): 27-30; 1975.

The author studied the activity of acid phosphatase in the cultures of 18 glial brain tumors (5 typical and 5 differentiated astrocytomas, 2 differentiated oligodendrogliomas, 2 glioblastomas, and 4 medulloblastomas). The enzyme was consistently demonstrated in differentiated and activity proliferating cells as well as in cells with signs of dystrophy. The increase in acid phosphatase activity under experimental growth conditions of gliomas in vitro was probably caused by the accelerated proliferation, accompanied by intensification of the metabolic processes. The enzyme displayed generally moderate activity in monomorphic tumor cells and increased activity in atypical neoplastic cells. Its activity was increased significantly in cells presenting dystrophic and necrobiotic alterations. The data indicate that, depending upon the functional state of tumor cells in tissue culture, acid phosphatase activity may be linked with various phases of cell metabolism.

1738 HEXOKINASE ISOZYMES IN HUMAN NEOPLASTIC AND FETAL TISSUES: THE EXISTENCE OF HEXOKINASE II IN MALIGNANT TUMORS AND IN PLACENTA.

(Eng.) Kamel, R. (Institut fuer Anthropologie und Humangenetik der Universitaet, D-8000 Muenchen 2, Richard Wagner-Strasse 10^1, W. Germany); Schwarzfischer, F. *Humangenetik* 30(2): 181-185; 1975.

The distribution of electrophoretic fractions of hexokinase in extracts of 53 human primary tumors, homologous normal tissues, and fetal organs was investigated. The separated electrophoretic fraction of hexokinase, designated HK I, occurred in every tissue and represented the main fraction. HK II was found in every tumor, except in benign meningiomas and astrocytomas and in placental tissue. Glioblastomas, melanoblastomas, and kidney carcinomas showed HK I and HK II, while in normal brain, chorioidea, and kidney, only HK I was found.

1739 FORMATION OF THYMIDINE KINASE AND DEOXYCYTIDYLATE DEAMINASE IN SYNCHRONIZED CULTURES OF CHINESE HAMSTER CELLS TEMPERATURE-SENSITIVE FOR DNA SYNTHESIS.

(Eng.) Kit, S. (Baylor Coll. Medicine, Houston, TX 77025); Jorgensen, G. N. *J Cell Physiol* 88(1): 57-64; 1976.

Cytosol thymidine kinase (TK) and deoxycytidylate (dCMP) deaminase formation was investigated in synchronized cultures of K12 Chinese hamster cells that have a temperature-sensitive lesion affecting the initiation of DNA synthesis. Enzyme formation was found to be cycloheximide-sensitive and temperature-dependent. Beginning at about 6 hr after addition of medium with 10% calf serum to serum-depleted K12 cultures, cytosol TK and dCMP deaminase activities increased when the cultures were incubated at 36.5 C, but not at 40.5 C. When cultures were shifted from 36.5 C to 40.5 C at 4, 6, or 8 hr after serum addition, TK activity continued to increase, though not to the level observed at 10 hr in cultures maintained at 36.5 C. Actinomycin D addition at the time of serum reversal or 4 hr later blocked the TK increase normally observed at the permissive temperature at 10 hr. However, when actinomycin D addition was delayed for 6 or 8 hr after serum addition, the increase in TK measured at 10 hr resembled that observed in the temperature shift-up experiments. The results provide evidence that the mutation in K12 Chinese hamster cells most likely blocks the progression through G1 into S, and suggest that transcription or posttranscriptional processing required for TK formation is affected. The protein influenced might be a component of the RNA polymerase complex or it might have a role in the condensing of certain chromosome regions or in the processing of particular messenger RNA's.

1740 CELL DENSITY DEPENDENT REGULATION OF PHENYLALANINE HYDROXYLASE ACTIVITY IN HEPATOMA CELLS: EVIDENCE FOR BOTH AN ACTIVE AND INACTIVE ENZYME FORM.

(Eng.) McClure, D. (Milton S. Hershey Medical Center, Pennsylvania State Univ., Hershey, PA 17033); Miller, M. R.; Shiman, R. *Exp Cell Res* 98(2): 223-236; 1976.

The cell density dependent regulation of phenylalanine hydroxylase activity in Reuber hepatoma (H4) cells growing in monolayer culture was examined. Phenylalanine hydroxylase activity in the cells is an exponential function of cell density (cells/cm^2). No discontinuity in the relationship was seen with the formation of a confluent monolayer. A quick change in enzyme activity in the cells was observed with dilution or concentration of the cell cultures. Loss in activity was a first order process which started at the time of subculture with the rate of loss dependent on the density of the subculture. The gain in activity began 6-8 hr after subculture to a higher density; it could be blocked by cycloheximide and had a maximum rate of increase that was about 10% of the maximum rate of loss of activity. With immunochemical procedures, the same amount of phenylalanine hydroxylase associated antigen in Reuber cells from low density was found as from high density cultures, over a range of phenylalanine hydroxylase sepcific activities from 0.2 to 4.2. After concentrating cells to a higher density, no increase in enzyme antigen was observed, despite a several-fold increase in enzyme activity and a requirement for protein synthesis during the process. An active and inactive phenylalanine hydroxylase is apparently present with the relative amounts of each determined by the cell density. If he modification of phenylalanine hydroxylase is ibutyryl cyclic 3',5'-adenosine monophosphate (db-AMP) dependent, then, under low density subculure conditions, the loss of activity is not the esult of a rapid decline in intracellular db-cAMP levels. The hydrocortisone stimulation of phenylalanine hydroxylase activity appears to work through a different mechanism than the cell density dependent process.

741 PURIFICATION OF TYROSINE HYDROXYLASE FROM PHEOCHROMOCYTOMA TUMORS. (Eng.)

ark, D. H. (New York Univ. Medical Center, 550 irst Ave., New York, NY 10016); Goldstein, M. *ife Sci* 18(1): 55-60; 1976.

yrosine hydroxylase was purified from human pheohromocytoma tumors. Polyacrylamide disc gel elecrophoresis of the enzyme preparation revealed a ingle enzymatically active protein band. A specifc antiserum to this purified tyrosine hydroxylase as produced in rabbits. The specificity of the ntiserum was demonstrated by immunoelectrophoretic nalysis as well as by the specific inhibition of yrosine hydroxylase. Enzyme inhibition studies evealed extensive cross-reactivity between the ntiserum and tyrosine hydroxylases from bovine nd rat adrenals and from rat striatum. The kinetic roperties of the purified pheochromocytoma enzyme re similar to those reported in the literature or the bovine adrenal enzyme.

742 PURIFICATION AND IMMUNOCHEMICAL CHARACTERIZATION OF DOPAMINE β-HYDROXYLASE FROM UMAN PHEOCHROMOCYTOMA. (Eng.)

Park, D. H. (New York niv. Medical Center, New York, NY 10016); Kashimoto, .; Ebstein, R. P.; Goldstein, M. *Mol Pharmacol* 2(1): 73-81; 1976.

opamine β-hydroxylase was purified from a human heochromocytoma. Following sucrose density gradient entrifugation the enzyme was isolated in three ifferent molecular forms. The bulk of the enzymatic ctivity was associated with fraction II (molecular t approximately 286,000), which possessed the highst specific activity. The specific activity of dopaine β-hydroxylase in fraction I (molecular wt approxmately 164,000) and in fraction III (molecular wt aproximately 524,000) was four times lower than in fracion II. A specific antiserum to human dopamine β-hyroxylase isolated from fraction II was produced in abbits (antiserum H). Electrophoretic and immunoogical evidence supports the contention that dopamine -hydroxylase in fraction II was isolated in pure form. he lower homospecific activity of dopamine β-hydroxlase in fraction I as compared with fraction II and he immunological titration data indicated that raction I contained more enzyme protein than was pparent from the enzyme activity. This could mean hat fraction I contains enzymatically inactive opamine β-hydroxylase, or that the specific activity f the dimer (fraction I) is lower than that of the etramer (fraction II). However, it is not known if ractions I and III occur naturally or are artifacts formed during purification. The immunological titration studies showed that antiserum H, as well as the antiserum to bovine adrenal dopamine β-hydroxylase (antiserum B), reduced the activity of the homologous enzyme more effectively than the activity of the heterologous enzyme. The poor interspecies cross-reactivity suggests that for measurements of human serum dopamine β-hydroxylase levels by radioimmunoassay, a homologous system is required.

1743 GLUCOSE-6-PHOSPHATE DEHYDROGENASE ACTIVITY IN A HEPATOMA CELL LINE: PRELIMINARY EVIDENCE FOR NEGATIVE GENETIC CONTROL. (Eng.)

De Luca, C. (Sch. Dentistry, State Univ. New York, Buffalo, NY 14226); Matheisz, J. S. *J Cell Physiol* 87(1): 101-109; 1976.

A line of cells, positive for glucose-6-phosphate dehydrogenase activity, has been separated from a negative parental stock derived from the H4-II-E-C3 rat hepatoma line. Cytogenetic analyses showed that specific marker chromosomes of the parent line were present in the variant. On the other hand, cells of the variant line contained three chromosomes fewer, on the average, than the total present in parent cells. Karyotypic analyses indicated the diminution in chromosome numbers to be in the subacrocentric group. The appearance of glucose-6-phosphate dehydrogenase associated with loss of chromosomes suggests that this enzyme is suppressed or under negative control in the parental stock. The consistent loss of chromosomes of the subacrocentric group suggests that the locus bearing regulatory activity is in the group III chromosomes.

1744 POST TRANSLATIONAL MODIFICATIONS OF GLUCOSE-6-PHOSPHATE DEHYDROGENASE IN HUMAN LEUKEMIAS. (Eng.)

Kahn, A. Hopital Beaujon, 100, boulevard du General Leclerc, 92110 Clichy, France); Cottreau, D.; Bernard, J. F.; Boivin, P. *Biomedicine* 22(6): 539-549; 1975.

The modifications of the electrofocusing pattern, the immunological reactivity and the kinetic properties of glucose-6-phosphate dehydrogenase (G-6PD) were studied in malignant blood cells of various leukemias and myeloproliferative disorders. Granulocytic G-6PD forms with decreased isoelectric points were found in all of five acute myeloid leukemias and four erythroleukemias, and in most chronic granulocytic leukemias and myelofibrosis. In contrast, granulocytic G-6PD from four patients with polycythemia vera was normal in all cases. Leukemic lymphocyte or lymphoblast G-6PD was identical to that from normal lymphocytes. The ratio of enzymatic activity to immunological reactivity (= molecular specific activity) was markedly decreased in the myeloblasts of two patients with acute myeloid leukemia and in the erythroblast-rich cellular fraction of a patient with erythroleukemia. In these cells the decrease of molecular specific activity paralleled the alteration of the electrofocusing pattern of G-6PD. The enzymatic forms with decreased isoelectric point also exhibited an altered affinity for glucose-6-phosphate. These modifications are posttranslational alterations of the neosynthesized G-6PD, since this enzyme is a single molecule, coded by the same gene in all tissues; they seem to correspond to an accelerated molecular aging due to an increased concentration of ''G-6PD modifying factors.'' The significance of an increased concentration of these G-6PD modifying factors in malignant cells is discussed.

1745 POLYAMINE CONCENTRATIONS IN BONE MARROW ASPIRATES OF CHILDREN WITH LEUKEMIA AND OTHER MALIGNANCIES. (Eng.) Rennert, O. (Box J-296, Univ. Florida Coll. Medicine, Gainesville, FL 32610); Miale, T.; Shukla, J.; Lawson, D.; Frias, J. *Blood* 47(4): 695-701; 1976.

High-pressure liquid chromatography analysis of polyamines was undertaken in bone marrow from 35 leukemic and ten nonleukemic subjects. This method demonstrated increased concentrations of putrescine, spermidine, and spermine associated with increased cellularity. The most striking abnormality was the marked elevation of putrescine. Bone marrow polyamine analysis may be an adjunct for evaluation of leukemia patients.

1746 HELA CELLS SECRETE α SUBUNIT OF GLYCOPROTEIN TROPIC HORMONES. (Eng.) Lieblich, J. M. (Natl. Inst. Arthritis, Metabolism and Digestive Diseases, Natl. Insts. Health, Bethesda, MD 20014); Weintraub, B. D.; Rosen, S. W.; Chou, J. Y.; Robinson, J. C. *Nature* 260(5551): 530-532; 1976.

Because ectopic secretion of human chorionic gonadotropin (HCG)-α subunits has been documented for a variety of neoplasms, the possibility that HeLa lines might also secrete the α subunit was investigated. Three HeLa strains -- HeLa CCL2, 2.1, and 2.2 -- were cultured at 37 C with α minimal essential medium and 10% fetal calf serum. Using a specific double-antibody radioimmunoassay with HCG-α as a reference standard, it was found that all three strains secrete a substance immunologically indistinguishable from the α subunit, with secretion rates differing as much as 50-fold. Although the elution pattern of HeLa α subunit on Sephadex G-100 was similar to that of HCG-α, HeLa-α did have a slightly higher apparent molecular weight. The fact that three HeLa strains have widely different secretion rates of α suggests that they may be useful in identifying the factors controlling the production of placental alkaline phosphatase, which is normally repressed in cervical cells.

1747 CLONED MOUSE MAMMARY CELL LINES REQUIRING ANDROGENS FOR GROWTH IN CULTURE. (Eng.) Desmond, W. J., Jr. (Dept. Biology, Univ. California, San Diego, La Jolla, CA 92093); Wolbers, S. J.; Sato, G. *Cell* 8(1): 79-86; 1976.

In the examination of clonally derived permanent cell lines exhibiting dependence upon androgens for growth, lines from the mouse mammary tumor Shionogi carcinoma 115 were established. The cells failed to grow in 1% fetal bovine serum-supplemented medium, but the addition of 10-50 nM androstanolone or testosterone resulted in exponential growth. Some other androgens, but not estrogens or progesterone, stimulated the growth of these cells. Steroid receptors were isolated from the cells. In addition to their effect on growth, androgens also caused a marked alteration in the cell and colony morphology of the clones. It would be a mistake to characterize these cells as entirely nongrowing, as some cells continue to divide even in the absence of hormone.

1748 BIOSYNTHESIS AND METABOLISM OF ANDROGENIC HORMONES IN CANCER OF THE PROSTATE. (Eng.) di Silverio, F. (Instituto di Clinica Urologica and Instituto di Patologia Medica II, Universita di Roma, Rome, Italy); Gagliardi, V.; Sorcini, G.; Sciarra, F. *Invest Urol* 13(4): 286-288; 1976.

The metabolism of sex hormones in prostatic adenocarcinoma was studied in vitro with tissue from six patients: three were untreated for 10 days and 2 yr (respectively) with a daily dose of 500 mg diethylstilbestrol, and the sixth patient received 200 mg daily of cyproterone acetate orally for 30 days. After labeling the biopsy specimens with ^{3}H-dehydroepiandrosterone sulfate and then incubating the specimens with steroids (dehydroepiandrosterone, Δ^{4}-androstenedione, testosterone, and dihydrotestosterone) the recovery of these steroids was measured by chromatography and spectrophotometry; recovery values ranged between 35 and 53%. The conversion of dehydroepiandrosterone sulfate into dehydroepiandrosterone was calculated, as was subsequent conversion into other steroids. The neoplastic tissue had an elevated sulfatase activity with the capacity to convert dehydroepiandrosterone sulfate into other dehydroepiandrosterones; the capacity for conversion into other androgenic metabolites was less evident. Only small amounts of testosterone and dihydrotestosterone were obtained, confirming that 3β-ol-dehydrogenase and 5α-reductase activity in neoplastic tissue was low or absent. This behavior was even more evident in patients treated with diethylstilbestrol with only one exception: a patient who was treated with estrogen for only 10 days; his tissue showed a more active conversion rate for all steroids. These findings confirm the observation that prostatic carcinoma tissue is able to metabolize androgens.

1749 EFFECT OF INTRAVENOUS GLUCOSE AND INSULIN ON PLASMA TRYPTOPHAN AND TYROSINE CONCENTRATIONS IN NORMAL SUBJECTS AND PATIENTS WITH CARCINOID TUMORS. (Eng.) Feldman, J. M. (Box 2963, Duke Univ. Medical Center, Durham, NC 27710); Plonk, J. W. *Metabolism* 25(1): 97-103; 1976.

The effect of iv glucose on the plasma tryptophan (Trp) and tyrosine (Tyr) concentration of 12 normal subjects, 6 patients with carcinoid tumors and the carcinoid syndrome (carcinoid syndrome), and 5 patients with carcinoid tumors without the carcinoid syndrome (tumor) was examined. Following iv glucose administration, the plasma Trp concentration of the normal subjects and the tumor patients increased, while the plasma Trp concentration of the carcinoid syndrome patients decreased. Following iv glucose administration, the plasma Tyr concentration of the normal subjects and the tumor patients decreased, while the plasma Tyr concentration of the carcinoid syndrome patients did not change. The response to iv insulin differed in some respects from the response to iv glucose: the plasma Trp of normal subjects did not change, but the plasma Trp of carcinoid syndrome patients decreased; the plasma Tyr concentration of the carcinoid syndrome patients did not change. The carcinoid syndrome patients had high serum serotonin concentrations and impaired glucose tolerance and insulin secretion, suggesting chemical diabetes mellitus, as compared to both normal subjects and tumor patients. Under appropriate experimental conditions, glucose administration can increase the plasma Trp concentration of normal human subjects.

1750 DIRECT EVIDENCE ON INCORPORATION OF THE RECEPTOR INTO THE NUCLEI OF RAT VENTRAL PROSTATE IN THE FORM OF THE COMPLEX WITH DIHYDROTESTOSTERONE.

(Eng.) Nozu, K. (Kyoto Res. Lab., Kakenyaku Kako Co. Ltd., Yamashina, Higashiyama-ku, Kyoto 607, Japan); Yitoh, H.; Tamaoki, B.-I. *Endocrinol Jpn* 22(6): 537-548; 1975.

The cytosol 9S receptor, labeled with ^{131}iodine (^{131}I) retained the activity fo forming a complex with ^{3}H-dihydrotestosterone, when examined by a sucrose density gradient centrifugation. When the receptor was incubated with isolated prostatic nuclei in the presence of ^{3}H-dihydrotestosterone, it was directly incorporated into the nuclei in a form of the complex bound to ^{3}H-dihydrotestosterone. The incorporation of ^{131}I-labeled receptor-^{3}H-dihydrotestosterone complex into the nuclei increased along with the raised temperature of incubation, whereas association of the complex with the chromatin reached maximum at 35 C and then decreased gradually beyond this temperature. In the time course study, either the incorporation of the complex into the nuclei or the association with the chromatin reached the maximal levels within 10 min and leveled off up to 60 min. ^{131}I-labeled serum protein was far less efficiently incorporated into the nuclei than the radioiodinated 9S receptor; association of the serum protein with the chromatin was limited to a very little extent. The ^{131}I-labeled 9S receptor-dihydrotestosterone complex associated with the chromatin was preferentially distributed into the non-histone protein as well as the DNA itself of the chromatin. The radioactivity lost by dehistonization of the chromatin was almost negligible. The cytosol 9S receptor fraction bound to ^{3}H-dihydrotestosterone was purified about 100 fold by the two consecutive column chromatographies. The partially purified receptor fraction which was labeled with radioiodine incorporated mostly into non-histone protein and DNA fractions. Apparently the cytosol receptor is required not only for transport of the steroid hormone to the nucleus but also for interaction of the hormone-receptor complex with the chromatin.

1751 INSULIN BINDING AND GLUCOSE TRANSPORT IN THE R3230AC MAMMARY ADENOCARCINOMA.

(Eng.) Harmon, J. T. (Univ. Rochester Sch. Medicine and Dentistry, Rochester, NY); Hilf, R. *J Supramol Struct* 4(2): 233(193)-240(200); 1976.

Cells dissociated from the R3230AC mammary adenocarcinoma from intact and diabetic female Fischer rats were examined for insulin binding and glucose transport. The dissociation constant (Kd) for insulin binding, approximately 10^{-10} M, was similar in all tumors studied. However, the apparent number of receptor sites per cell increased in cells from diabetic rats. Kinetic analysis of 3-O-methyl glucose (3-OMG) entry showed both differential and passive carrier characteristics. Insulin (4×10^{-9} M) in vitro did not affect diffusional entry, whereas the hormone altered the passive carrier system, as reflected by an increase in Km and Vmax. Insulin decreased initial velocity of glucose transport at 4-6 mM glucose levels but increased initial velocity of glucose transport on 20 mM glucose. An explanation of the role of insulin on tumor growth in vivo from effects on glucose transport in vitro is proposed.

1752 HETEROGENEITY OF HUMAN GROWTH HORMONE IN HYPOPHYSEAL ADENOMA CULTURES.

(Fre.) Binoux, M. (I.N.S.E.R.M., Laboratoire de Physiologie Endocrinienne Infantile, Hopital Trousseau, 24, avenue du Docteur Arnold-Netter, 75571 Paris Cedex 12, France); Donnadieu, M. *Pathol Biol (Paris)* 23(10):835-839; 1975.

In the attempt to determine the physiological significance of the different forms of human growth hormone (hGH) secreted by the hypophysis, hGH obtained from the cell cultures of two eosinophilic adenomas was studied physicochemically (chromatography and immunoreactivity) and physiologically (length of life and biological activity in a hypophysectomized rat). The hormone taken from the cultures of three organotypical tumors was also studied. Three immunoreactive slopes (of samples from four different cultures) differed significantly from the standard slope, which suggests that there are various hormonal structures and a variety of immunoreactive molecular types. The culture had a chromatographic curve similar to that of a normal sample although the proportion of dimers was less for the culture. Secreted hormone and hormone contained in the cells had similar chromatographic profiles, although the dimeric and immunoreactive proportions were higher in the latter; this may be the result of membrane alteration. Upon injection into the inferior vena cava, hGH was either quickly and reversibly fixated in a nonspecific way (independent of molecular weight) or was more slowly and permanently fixated by its specific hormonal target; the time for the latter case decreased with decreasing molecular weight. The physiological significance of these different molecular weights has not been determined. Tentative studies have shown that the hGH of a hypophysis tumor is apparently more active than the extracted hormone, probably as the result of a greater proportion of dimers.

1753 TUMOUR ANGIOGENESIS FACTOR (TAF) IN HUMAN AND ANIMAL TUMOURS.

(Eng.) Phillips, P. (Christie Hosp., Wolmslow Road, Withington, Manchester 20, England); Steward, J. K.; Kumar, S. *Int J Cancer* 17(5): 549-558; 1976.

Extracts were made from Walker 256 carcinoma, spontaneous rat mammary adenocarcinoma, Wilms' tumor, human neuroblastoma, and human hemangioma. Chromatography of the extracts on Sephadex G-100 yielded four fractions, A, B, C and D. Subcutaneous injection of fractions B and C resulted in the growth of new undifferentiated capillaries in the subcutaneous fascia of female Wistar rats. Similar extracts of normal rat liver or human kidney did not induce neovascularization. The endothelium of newly formed blood vessels contained many mitotic figures. To develop a quantitative in vitro assay for a tumor angiogenesis factor (TAF), short-term primary cultures were initiated from adult rat brain white matter that were vascular in origin. Addition of fractions containing TAF (B and C), which were active in vivo, failed to stimulate thymidine uptake by the cells. A possible reason for this failure is that the assay was not sufficiently sensitive. If the action of TAF could be inhibited, the growth of tumors might be restricted.

1754 CYTOPLASMIC MICROTUBULES IN TISSUE CULTURE CELLS APPEAR TO GROW FROM AN ORGANIZING STRUCTURE TOWARDS THE PLASMA MEMBRANE.

(Eng.) Osborn, M. (Max-Planck-Institut fuer Biophysikalishe Chemie, Goettingen, W. Germany); Weber, K. *Proc Natl Acad Sci USA* 73(3): 867-871; 1976.

A structure that appears to organize cytoplasmic microtubules in interphase mouse 3T3 cells was visualized by immunofluorescence microscopy. Purified monospecific antibody against homogeneous tubulin from brain visualized, in addition to cytoplasmic microtubules, a cytoplasmic polar structure as the focal point from which the microtubules seemed to radiate. The structure was preserved after treatments that depolymerize cytoplasmic microtubules, i.e., exposure of cells to mitotic drugs or to low temperature. When cells recovered from these treatments one end of each microtubule organizing structure acted as a nucleated center from which cytoplasmic microtubules grew toward the plasma membrane. Thus, cytoplasmic microtubules assemble in vivo in an ordered unidirectional manner, and therefore the cell must be able to avoid the assembly of unwanted, unoriented, and disconnected microtubules. These results suggest that the assembly of tubulin into microtubules is regulated in vivo.

1755 ESTABLISHMENT OF CONTINUOUS ORGANOTYPIC CULTURES FROM NERVOUS SYSTEM TUMORS.

(Eng.) Lyser, K. M. (Hunter Coll. of the City Univ., New York, NY 10021). *Tissue Cult Assoc Man* 1(3): 127-132; 1975.

A new method for the establishment of continuing organotypic cultures for nervous system tumors, particularly human neuroblastoma, was discussed. The procedure, an adaptation of the Wolff method, and the necessary materials are given in detail. The author reported success with neuroblastoma cultures that were grown with chick embryo mesonephros that acted supportively, on a semi-solid medium, in a fold of chicken egg vitelline membrane. With these cultures one can bridge the gap between the in vivo situation and cell cultures and explore possible differences in selection and adaptation to in vitro conditions when intercellular relations are maintained. The major disadvantages of this method are the time-consuming aspect of culture maintenance and the fact that direct observation of living cultures is severely limited.

1756 LIMITATION OF MULTINUCLEATION BY DIBUTYRYL ADENOSINE 3',5'-CYCLIC MONOPHOSPHATE IN TUMOR CELLS TREATED WITH CYTOCHALASIN B.

(Eng.) O'Neil, F. J. (Univ. Utah Coll. Medicine, Salt Lake City, UT 84132). *J Natl Cancer Inst* 56(2): 345-348; 1976.

The effect of dibutyryl adenosine 3',5'-cyclic monophosphate (Bu2cAMP) on cytochalasin B (CB)-treated hamster BHK21 tumor cells and human rhabdomyosarcoma (RD) cells was examined. Nearly 80% of BKH cells contained four or more nuclei after seven days of exposure to CB, and 35% of these had at least seven nuclei. Similar frequencies of multinucleation were obtained with RD cells. Administration of 10^{-3} M theophylline and Bu2cAMP at 5×10^{-4} M or 10^{-3} M to CB-treated RD or BHK cells greatly reduced the frequency of cells with five or more nuclei but increased the number of binucleated cells. Bu2cAMP was toxic and caused many CB-treated BHK cells to detach from the culture surface, but not all cells were killed. Bu2cAMP had little toxic effect on CB-treated RD cells. The inhibition of high degrees of multinucleation were thus not the result of nonspecific toxic effects of Bu2cAMP, but nuclear division was limited by it. Addition of only theophylline and Bu2cAMP to either BHK or RD cells resulted in growth to significantly lower saturation densities. The toxicity of Bu2cAMP on cells in crowded cultures apparently caused the limited propagation. Bu2cAMP resulted in significant cell killing or detachment but, once the lower saturation densities were reached, cell death was minimized. Thus Bu2cAMP did not restore contact inhibition per se. Untreated RD cells grew to lower concentration densities than expected from the microscopic inspection of cells in situ. Microscopic inspection revealed high concentration densities and numerous mitoses. This apparent contradiction was due to the ability of RD cells to fuse upon the attainment of confluence and to produce multinucleated cells without the aid of CB.

1757 PYRIDINE NUCLEOTIDE METABOLISM IN MITOTIC CELLS. (Eng.) Elliott, G. (Dept. Biology, Univ. Utah, Salt Lake City, Utah); Rechsteiner, M. *J Cell Physiol* 86(3): 641-652; 1975.

Biosynthesis and turnover of NAD were examined in mitotic cells of the human culture line, D98/AH2. No significant difference in the incorporation of nicotinic acid or nicotinamide could be detected between mitotic and interphase cells. The distribution of newly-incorporated nicotinic acid among the various pyridine nucleotides was also identical in mitotic and interphase cells. Compared to the equivalent rates of biosynthesis in mitotic and interphase cells, the pyridine ring of NAD was lost twice as fast from mitotic as from interphase cells. Loss of the pyridine ring to the medium was not necessarily an accurate measure of turnover; the difference between mitotic and interphase cells could reflect differential reutilization of the pyridine ring within the cell. NAD turnover was substantial in mitotic cells and possibly greater in mitotic cells than interphase cells.

1758 INFLUENCE OF MONO- AND MULTIVALENT CATIONS ON THE ELECTROKINETIC PROPERTIES OF NORMAL HUMAN LYMPHOID AND BURKITT LYMPHOMA CELLS. (Eng.) Kiremidjian-Schumacher, L. (Coll. Dentistry, New York Univ., 421 First Ave., New York, NY 10010); Stotzky, G. *Experientia* 32(3): 312-314; 1976.

Various mono- and multivalent cations, at constant ionic strength, affected the surface electrokinetic properties of normal human lymphoid and Burkitt lymphoma cells in a manner that reflected more the physico-chemical properties and binding affinities of the cation than its valence, contrary to what would be predicted by the lyophobic colloid theory. The effect was expressed in the changes of the magnitude of the net surface charge and in the shift of the isoelectric point of the surface. These changes were greater at the surface of Burkitt's lymphoma cells than at the surface of their normal cell line counterparts.

1759 ORGANIC FREE RADICALS, ANTIOXIDANTS, SENESCENCE, MAXIMAL LONGEVITY, AND CANCER. (Fre.) Duchesne, J. (Departement de Physique Atomique et Moleculaire, Institut de Physique de l'Universite de Liege, B-4000 Sart-Tilman, Belgium). *Bull Classe Sci* 61(7): 651-657 (Series 5); 1975.

Organic free radicals, which are associated with redox enzyme activity, were studied in normal and tumor tissues to determine their role in carcinogenesis, senescence, and longevity. Since tumors are characterized by low free radical levels, it is proposed that the tumor state is linked to specific pre-existing substanced, such as the antioxidants vitamin C and vitamin E, which augment tumor growth and destroy free radicals. The concentration of these antioxidants is greater around tumors. In low amounts they prolong life, while in great concentrations they induce both malignant and benign tumors. Free radical concentration increases after birth until it reaches a characteristic adult level. In birds and mammals, free radical concentration of the brain diminishes as longevity increases; longevity, then, is associated with low free radical concentrations. It is proposed that a tumor, with its increased antioxidant levels, is thus an attempt to ward off senescence. Although senescence will be augmented, tumor growth can perhaps be inhibited by administration of anti-antioxidants.

1760 HAZARD OF MAMMOGRAPHY (Letter to Editor). (Eng.) Fish, W. (Providence Professional Building, 3300 Providence Drive, Suite 211, Anchorage, AK 99504). *Ann Intern Med* 84(4): 500; 1976.

1761 EVALUATION OF A SHORT TERM IN VITRO TEST FOR GRANULOCYTE CHALONE ACTIVITY. (Eng.) Maurer, H. R. (Pharmazeutisches Institut der Freien Universitaet, Koenigin-Luise-Str. 2/4, D-1000 Berlin 33, W. Germany); Weiss, G.; Laerum, O. D. *Virchows Arch [Zellpathol]* 20(3): 229-238; 1976.

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National Cancer Institute

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PREFACE

Carcinogenesis Abstracts is a publication of the National Cancer Institute. The journal serves as a vehicle through which current documentation of carcinogenesis research highlights are compiled, condensed, and disseminated on a regular basis. It represents an integral part of the Institute's program of fostering and supporting coordinated research into cancer etiology. Issues of *Carcinogenesis Abstracts* normally contain three-hundred abstracts and three-hundred citations (unaccompanied by corresponding abstracts). Abstracts and citations refer to the current scientific literature that describes the most significant carcinogenesis research carried on at the National Cancer Institute, other governmental agencies, and private institutions. *Carcinogenesis Abstracts* is intended to be a highly useful current awareness tool for scientists engaged in carcinogenesis research or related areas. The great number and diversity of publications relevant to carcinogenesis make imperative the availability of this service to investigators whose work requires that they keep abreast with current developments in the field.

Carcinogenesis Abstracts is normally published monthly. Volume XIV covers the scientific literature published from Jan 1976 through Dec 1976. To increase the usefulness of *Carcinogenesis Abstracts*, Volume XIV, a Wiswesser Line Notation index and a Chemical Abstracts Service Registry Number index have been provided. These indexes reference compounds described in abstracted articles. A cumulative subject, author, CAS Registry Number, and Wiswesser Line Notation index for Volume XIV will be published shortly after the final regular issue.

Carcinogenesis Abstracts is available free of charge to libraries and to individuals who have a professional interest in carcinogenesis. Requests for *Carcinogenesis Abstracts* from qualified individuals should include statements of their relationship to carcinogenesis research. All correspondence should be addressed as follows.

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NOTE

Journal names are abbreviated according to the list of abbreviations used by *Index Medicus*. For journals not covered by *Index Medicus*, the abbreviations found in *Chemical Abstracts Service Source Index*, 1907-1974 Cumulative, are used. New journals are verified in *New Serial Titles* and abbreviated according to *International Standard ISO 833*. An asterisk indicates the author to address (other than the primary) in requesting reprints.

LANGUAGE ABBREVIATIONS

Afr.	Afrikaans	Ind.	Indonesian
Ara.	Arabic	Ita.	Italian
Bul.	Bulgarian	Jpn.	Japanese
Chi.	Chinese	Kor.	Korean
Cro.	Croation	Lav.	Latvian
Cze.	Czech	Lit.	Lithuanian
Dan.	Danish	Nor.	Norwegian
Dut.	Dutch	Pol.	Polish
Eng.	English	Por.	Portuguese
Est.	Estonian	Rum.	Rumanian
Fin.	Finnish	Rus.	Russian
Fle.	Flemish	Ser.	Serbo-Croatian
Fre.	French	Slo.	Slovak
Geo.	Georgian	Spa.	Spanish
Ger.	German	Swe.	Swedish
Gre.	Greek	Tha.	Thai
Heb.	Hebrew	Tur.	Turkish
Hun.	Hungarian	Ukr.	Ukrainian
Ice.	Icelandic	Vie.	Vietnamese

ABBREVIATIONS USED IN ABSTRACTS

A	angstrom(s)	M	molar
ACTH	adrenocorticotropic hormone	mM	millimolar
ADP	adenosine diphosphate	μM	micromolar
AMP	adenosine monophosphate	mOsm	milliosmolar
ATP	adenosine triphosphate	mEq	milliequivalents
BCG	Bacillus Calmette Guerin	min	minute(s)
bid	twice daily	mo	month(s)
C	degrees centigrade	MTD	maximum tolerated dose
cal	calorie(s)	N	normal concentration
kcal	kilocalorie(s)	NAD	nicotinamide adenine dinucleotide
cc	cubic centimeter(s)	NADH	reduced nicotinamide adenine dinucleotide
Ci	curie(s)	NADP	nicotinamide adenine dinucleotidephosphate
mCi	millicurie(s)	NADPH	reduced nicotinamide adenine dinucleotide-phosphate
μCi	microcurie(s)		
cm	centimeter(s)	ng	nanogram(s) (10^{-9})
CNS	central nervous system	od	once daily
cpm	counts per minute	Pa	ambient pressure
dl	deciliter(s)	PAS	periodic acid-Schiff
ml	milliliter(s)	pg	picogram(s) (10^{-12})
μl	microliter(s)	pgEq	picogram equivalent
DNA	deoxyribonucleic acid	po	orally
ED$_{50}$	median effective dose	ppb	parts per billion
EDTA	ethylenediamine tetraacetic acid	ppm	parts per million
ESR	erythrocyte sedimentation rate	qid	four times daily
g	gram(s)	qod	every other day
kg	kilogram(s)	QO$_2$	oxygen quotient
mg	milligram(s)	R	roentgen(s)
μg	microgram(s)	RBC	red blood cells (erythrocytes)
Hb	hemoglobin	RNA	ribonucleic acid
hr	hour(s)	sc	subcutaneous
ia	intra-arterial	sec	second(s)
ic	intracerebral	SGOT	serum glutamic-oxalacetic transaminase
icav	intracavitary	SGPT	serum glutamic-pyruvic transaminase
id	intradermal	SRBS	sheep red blood cells
ILS	increased life span	TCD	tissue culture dose
im	intramuscular	TCD$_{50}$	median tissue culture dose
ip	intraperitoneal	tid	three times daily
ipl	intrapleural	U	unit(s)
it	intratumorous	mU	milliunit(s)
IU	International Unit	UV	ultraviolet
iv	intravenous	vol	volume
K$_m$	Michaelis constant	WBC	white blood cells (leukocytes)
LD	lethal dose	wk	week(s)
LD$_{50}$	median lethal dose	wt	weight
m	meter(s)	x	times
mm	millimeter(s)	yr	year(s)

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1801 THE ROLE OF THE NEUROENDOCRINE SYSTEM IN MURINE MAMMARY TUMORIGENESIS. (Eng.) Welsch, C. W. In: *Host Defense Against Cancer and Its Potentiation. Proceedings of the 5th International Symposium of the Princess Takamatsu Cancer Research Fund, Tokyo, 1975.* (Baltimore: Univ. Park Press); pp. 281-301; 1975.

The role of the CNS in the genesis of murine mammary tumors was first demonstrated when reserpine administration hastened the development of mammary tumors in mice. Subsequent investigations have corroborated these results. Median eminence hypothalamic electrolyte lesions placed in rats with carcinogen-induced mammary carcinomas resulted in a sharp increase in tumor growth and also markedly increased the incidence of spontaneous mammary tumors in female rats. The administration of certain ergot alkaloids and ergoline derivatives, which mimic the activity of the hypothalamic-prolactin release-inhibiting factor, to rats with carcinogen-induced mammary carcinomas resulted in a prompt regression of these tumors closely mimicking the mammary oncolytic benefits of hypophysectomy. Chronic treatment of a high-mammary cancer strain of mice with ergot drugs prevents the subsequent development of spontaneous mammary carcinomas. Thus, it appears that prolactin is a key hormone in murine mammary tumorigenesis and that the contributory role of the CNS is significant. (77 references)

1802 HORMONES AND BREAST CANCER. (Fre.) Vokaer, R. (Hopital Universitaire Brugmann, Universite Libre de Bruxelles, Brussels, Belgium). *J Gynecol Obstet Biol Reprod* 4(Suppl. 2): 189-197; 1975.

Various aspects of the relation of hormones to breast cancer, notably the prognosis of breast cancer by monitoring androgen and/or corticoid levels, by looking for estrogen receptors, and by the Bulbrook mathematical equation and the Diczfalusy and Lauritzen coefficient, are reviewed. The possible roles of estrogens, antiestrogens, prolactin, and somatotropin are also included. Breast cancer may be greatly conditioned by estrogen-prolactin synergy. Viruses, radiation, and genetic predisposition render mammary tissue receptive to the action of these hormones. Estrogens, the cytoplasmic receptors of which can interact with other hormones, play a large role in the induction of specific RNA synthesis. Tumoral hormone sensitivity depends finally on the cytoplasmic estrogen receptors, on androgens, progesterone, and corticoids, and on the prolactic, insulin, and somatotropin membrane receptors. (No references)

1803 HORMONES IN CANCER GROWTH AND TREATMENT. (Eng.) Hardy, J. D. (Univ. Mississippi Medical Center, Jackson, MS). *Bull Soc Int Chir* 34(5): 355-364; 1975.

In general, only hormones that stimulate growth are carcinogenic, and this carcinogenic effect can be expected mainly in the target organ of that particular hormone. Hormones with notable carcinogenic potential are the trophic hormones of the pituitary and the steroid hormones, especially the estrogens. For example, the beneficial effect of ovariectomy in breast cancer has been demonstrated in clinical and experimental studies. The qualitative and quantitative measurement of hormones in plasma and urine affords many advantages in cancer diagnosis. Such data can also provide information related to the histological structure of the tumor. Several diagnostic tests were discussed in this context. Hormonal therapy, either by endocrine organ ablation or hormone administration, has an important therapeutic role in the management of advanced cancer. The course of therapy for female breast cancer, prostatic cancer, and endometrial cancer were outlined. (33 references)

1804 THE EPIDEMIOLOGY OF PROSTATIC CANCER--A MATTER OF HORMONES? (Eng.) Wynder, E. L. (No affiliation given). *Med J Aust* 1(11): 334; 1976.

A study of 128 patients with benign prostatic hypertrophy and 290 prostatic cancer patients (with the same numbers of controls) indicated that the prostatic cancer patients were more fertile, based on the mean number of pregnancies for their wives, than the benign prostatic hypertrophy group or the controls. It is suggested that fertility may be a manifestation of constitutional-hormonal factors that increase the risk of prostatic cancer in these patients. (7 references)

1805 CARCINOGENICITY TESTS (Letter to Editor). (Eng.) Ames, B. N. (Dept. Biochemistry, Univ. California, Berkeley, CA 94720). *Science* 191(4224): 241-245; 1976.

There is compelling evidence that chemical carcinogens cause cancer through damage to DNA. About 90% (156/174) of carcinogens tested were found to be mutagenic to *Salmonella* bacteria in the presence of activating mammalian microsomal enzymes. Other evidence includes the observation that humans lacking DNA repair systems are extremely prone to cancer, and the established correlation between the capacity for the repair of DNA damage and the occurrence of organ-specific neoplasms. The theory is simple and accounts for what is known about the molecular biology of chemical carcinogenesis and the genetics of cancer. Mutational damage to DNA may not be the only cause of cancer, and a few environmental chemicals may work through other mechanisms. However, the evidence indicates that chemicals and radiation in the environment (cigarette smoke, ultraviolet light, nitrosamines, etc.) damage DNA, and that this damage, incurred throughout our lifetimes, initiates most human cancers, and is also a major contributor to birth defects, aging and heart disease. The inexpensive and rapid *Salmonella* mutagenicity test should be used as a primary screening technique to pinpoint potentially dangerous chemicals, even in complex mixtures, and to complement the traditional long-term animal tests for carcinogenicity. There is an extremely high probability that chemicals found to be mutagenic in the *Salmonella* test will turn out to be carcinogens. (26 references)

1806 TROPICAL CIRRHOSIS AND HEPATOMA. (Eng.) Coady, A. (Medical Res. Council Labs., Fajara, The Gambia, West Africa). *J R Coll Physicians Lond* 10(2): 133-114; 1976.

The controversial etiology (nutritional vs infectious) of cirrhosis and primary hepatoma in Third World countries is reviewed. The evidence for a toxic etiology is largely indirect. Aflatoxin (AF) can, in animal models, lead to hepatoma after varying intervals without any discernable chronic process. AF has an acute DNA-blocking effect and has been shown to interact with another group of naturally occurring hepatotoxins, the pyrrolizidine alkaloids (PA). Both AF and PA may affect immunocytes in veno-occlusive disease, and hepatocytes and immunocytes may be deleteriously exposed to similar substances simultaneously with hepatocyte colonization by a virus that the organism cannot eliminate without a fully active immune system. The immune response to the virus might be impaired concurrently with direct chemical toxicity to the liver cells. As aspect of hepatitis B (HB) infection of possible relevance is the increase in antigen titer that precedes clinically patent acute disease, coincident with a wave of DNA polymerase activity. Since part of the structure of HB antigen is host derived, it has been proposed that genetically determined nonrecognition of HB antigen may select for survival in undeveloped societies. The incidence of lymphomas has been associated with toxigenic fungi in Eastern Europe. Hepatoma may result from a runaway mutant arising in a regenerating hepatocyte in cirrhosis. In a noncirrhotic liver, a cell leached free of DNA-arresting AF or PA might resume uninhibited replication with a consequently damaged template mechanism. Unrestrained liver cell activity can give rise to α-fetoprotein that might suppress anticancer immunosurveillance. Protozoal or schistosomal suppression of the defensive response to viral infection could be a factor, along with other bacterial factors. The diseased liver may have a grossly impaired ability to handle chemical compounds. Regarding the nutritional theory of the origin of these disorders, the cation environment may be of importance. The impressive prevalence of HB antigenemia among people with and without disease continues to raise the question of the primary etiologic agent. (102 references)

1807 'WARNING: BACON CAN DAMAGE YOUR HEALTH'. (Eng.) Anonymous. (No affiliation given). *New Sci* 70(999): 300; 1976.

Nitrosamines, many of which are potent carcinogens, are currently used in bacon to preserve the meat, color, and flavor and to inhibit *Clostridium botulinum* growth. Tests have shown that most of the nitrosamines are found in the fat rather than the lean or rind portions. A nitrite-free bacon has been produced, but its shelf life is only 1 wk. Several authors have suggested lowering the nitrite level, but others have warned against it to prevent outbreaks of botulism. (4 references)

1808 AIR POLLUTION DUE TO ASBESTOS AND ITS ROLE IN HUMAN PATHOLOGY. (Fre.) Freour, P. (Clinique de Pneumo-Phtisiologie et Laboratoire d'Hygiene, Bordeaux, France); Pierron, J.-R. *Bordeaux Med* 8(13): 1531-1545; 1975.

The literature concerning asbestos is reviewed to determine whether asbestos, as an atmospheric pollutant, plays a carcinogenic role in bronchial cancers. Although numerous animal experiments have shown a correlation between exposure to asbestos and bronchial cancer, these results cannot definitely be applied to humans. However, autopsies of bronchial cancer patients have revealed the presence of asbestos bodies in the lungs. Environmental studies of atmospheric pollution by asbestos in and around industrial sites are reviewed. It is concluded that asbestos pollution is likely to be a factor, secondary to tobacco, in the genesis of bronchial cancer. (18 references)

1809 DIETARY IODINE AND RISK OF BREAST, ENDOMETRIAL AND OVARIAN CANCER. (Eng.) Stadel, B. V. (Natl. Inst. Child Health and Human Development, Bethesda, MD 20014). *Lancet* 1(7965): 890-891; 1976.

Geographic differences in the rates of breast, endometrial and ovarian cancer appear to be inversely correlated with dietary iodine intake. Endocrinologic considerations suggest that a low dietary iodine intake may produce a state of increased effective gonadotropin stimulation, which in turn may produce a hyperestrogenic state characterized by relatively high production of estrone and estradiol and a relatively low estriol to estrone plus estradiol ratio. This altered endocrine state may increase the risk of breast, endometrial, and ovarian cancer. Increasing dietary iodine intake may reduce the risk of these cancers. (16 references)

1810 MUTAGENESIS AND CARCINOGENESIS. (Eng.) Boyland, E. (London Sch. Hygiene and Tropical Medicine, Keppel St. Gower St., London WC1E 7T, England). *Arch Geschwultsforsch* 45(7): 625-627; 1975.

A correlation between carcinogenesis and mutagenesis is an expected occurrence because the biochemical changes in both are probably reactions with the nucleic acids of cells. With many chemical compounds, enzyme activation is necessary to induce a somatic mutation. The conjugation of a chemical in the liver could result in its transformation to another tissue of the body, where it could be released by an enzyme and become mutagenic. Once a mutation occurs, the immune system may prevent carcinogenesis, but it is unlikely to alter any mutagenic activity. For a mutation to be inheritable, it must occur in a germ cell, but if an indirect mutagen could pass through the placental barrier and become activated by the enzyme system of the embryo, it must be considered carcinogenic. (4 references)

1811 ''DIETETIC FIBERS:'' THEIR ROLE IN PATHOLOGY. (Fre.) Coste, T. (Service de Medecine, Hopital Franco-Musulman, 125, rue de Stalingrad, 93009 Bobigny, France); Rautureau, J.; Gouffier, E. *Nouv Presse Med* 4(37): 2651-2654; 1975.

The literature concerning the nondigestible dietetic fibers, which are composed of lignin and the nonutilizable polysaccharides cellulose, hemicellulose, and pectin, is reviewed. The absorption and retention of water in the gastrointestinal tract by these fibers prevent constipation. Deficiency of dietetic fibers is associated with colic diverticulosis, in that too compact fecal masses induce intense colic contraction, and with colic cancer, in that certain carcinogenic bacterial degradation products are allowed too much contact with the colic paries. Deficiency of dietetic fiber is also associated with gallstones and hypercholesterolemia. (16 references)

1812 TUMORS INDUCED BY IMPLANTED INSTRUMENTS: NATURE AND POSSIBLE CONTROL OF ETIOLOGIC FACTORS. (Eng.) Brand, K. G. (Univ. Minnesota Medical Sch., Minneapolis, MN 55455). *Int J Chronobiol* 3(3): 205-211; 1976.

Implanted instruments such as sensors, monitors, or other devices have led to sarcomas in various animal species used in long-term biometric studies. Extreme species differences have been observed, with rats and mice having the highest susceptibility and hamsters, dogs, and humans having a relatively low incidence. Preventative measures include use of low risk species in studies, regular palpatory mobilization with ip implantation, the smallest possible size implant to minimize fibrosis, and roughening the implant surface to decrease fibrosis further. In humans sc implants are considered safe for up to 2 yr. If longer implantation periods are required, regular examinations are stressed. Any active changes of the surrounding tissue warrants removal of the implant and observation of the site for several years. (6 references)

1813 LEUKEMIA AND RELATED DISORDERS. (Eng.) Ichimaru, M. (Sch. Medicine, Nagasaki Univ., Nagasaki, 852, Japan); Ishimaru, T. *J Radiat Res* 16(Supplement): 89-96; 1975.

Studies of radiation leukemogenesis in atomic bomb survivors are reviewed. Leukemia appeared early and was one of the most striking evident somatic effects of radiation in atomic bomb survivors. Leukemogenic effects of radiation vary by quality and quantity of radiation dose, age at the time of exposure, elapsed time after exposure, and type of leukemia. Although the risk of leukemia in atomic bomb survivors is now greatly reduced with elapsed time after exposure, there is no evidence that the risk has returned to control levels in those survivors who received a significant radiation dose even almost 20 yr after the bombings. No significant clinical and pathologic manifestation of leukemia related to radiation dose was reported except the absence of chronic lymphocytic leukemia in survivors who received a significant dose. Studies concerning atomic bomb exposure and the incidence of related disorders such as malignant lymphoma, aplastic anemia, and other hematologic disorders are also briefly reviewed. (53 references)

.814 INFERENCES ON RADIATION CARCINOGENESIS REVEALED BY SELECTED STUDIES IN ANIMALS. (Eng.) Bustad, L. K.; Goldman, M.; Rosenblatt, L. In: *Biology of Radiation.* Edited by J. M. Yuhas; R. W. Tennant; J. D. Regan. (New York: Raven Press): pp. 13-29; 1976.

Studies on radionuclide-induced neoplasms of bone, bone marrow, skin, and thyroid in humans and in long-lived animals (dogs, sheep, rabbits, swine, mice, rats, and cows) are reviewed. Dose-response curves for various radionuclides were found to be similar regardless of the species studied or the tissues at risk, with a wide dosage range producing a non-linear tumor incidence curve. The induction of neoplasms was confined to irradiated tissues, and when no detectable injury was produced in target tissues the tumor risk was minimal or absent. The cell repopulation processes appeared to require a minimum injury, with rates of renewal being possibly related to cancer risk. The repair and restoration of injured cells appeared to be more important than the initial injury itself. Viruses were not involved in all radiation induced neoplasms, which also appeared in the absence of detectable changes in the immune system. (61 references)

1815 ONCORNAVIRUSES II: VIRUS-HOST INTERACTIONS. GENETIC CONTROL OF ENDOGENOUS AVIAN TUMOR VIRUS EXPRESSION. (Eng.) Crittenden, L. B. (Regional Poultry Res. Lab., 3606 East Mount Hope Road, East Lansing, MI 48823); Robinson, H. L. *Bibl Haematol (Basel)* (43): 146-150; 1976.

Evidence for the genetic control of the expression of endogenous avian tumor viruses is reviewed. Spontaneous expression of the endogenous infectious virus (RAV-0) appears to result from the release from controls that repress transcription or perhaps translation of the DNA provirus into viral products. Three dominant genes, gs+, V, and hE, have been identified that act rather independently in controlling different viral functions. The gene gs+ is associated with the presence of gs antigen and the associated chick helper factor in the absence of complete virus production. V is associated with the spontaneous production of RAV-0, and hE is associated with a very high level of chick helper factor in the presence of very low levels of gs antigen and RAV-0 production. Subgroup E viruses can be induced in most cell types by physical and chemical agents (bromodeoxyuridine, for example), suggesting that proviral DNA is present in most chickens. The fact that bromodeoxyuridine treatment efficiently induces virus production in some lines of chickens and not others suggests that not all of them have inherited the complete DNA provirus or that it is very tightly controlled in nonresponding lines. The possibility exists of structural provirus differences that are too subtle to detect by nucleic acid hybridization methods. (23 references)

1816 MAREK'S DISEASE, LUCKE'S FROG CARCINOMA AND OTHER ANIMAL ONCOGENIC HERPESVIRUSES. (Eng.) Sharma, J. M. (Regional Poultry Res. Lab., 3606 East Mount Hope Road, East Lansing, MI 48823). *Bibl Haematol (Basel)* (43): 343-347; 1976.

Host-virus relationships in Marek's disease (MD) and the association of herpesviruses in other animal tumors are reviewed. The cycle of infection of MD may involve entry via the respiratory tract, infection of lymphoid cells, and subsequent transmission to other parts of the body. Infected chickens may remain viremic throughout life. It is assumed that some genome-carrying lymphoid cells undergo transformation and initiate lymphomas. The immune system in the host responds to the virus and its antigens, and the lesion either progresses to death or regresses. The spectrum of pathologic lesions is determined by several factors, such as viral strain, genetic background and age of the host, and severity of exposure. Both T and B cells are present in the lymphoma, but recent evidence indicates that the T cell is the one that undergoes neoplastic transformation. Although infection with MD virus depresses B and T cell functions, the infected host mounts a well-pronounced immune response to the virus and its antigens. Evidence for a role of the immune response in defense against the disease has recently been obtained in studies in resistant chickens. Although cell-free fractions of Lucke's renal adenocarcinoma containing herpesvirions are infectious and transmit renal tumors when injected into frog embryos, in vitro propagation of the virus has not been successful. The natural mode of transmission is not entirely clear. The presence of virus in tumor cells is dependent on body temperature: at cold temperatures the virus becomes activated and productively infects tumor cells, giving rise to intranuclear inclusions and virions; at temperatures above 11.5 C, the virus no longer remains detectable and inclusions disappear. The virus genome persists in inclusion-free tumor cells. Tumor incidence is higher in frogs collected during the spring and autumn, but extremely low in those collected during the summer. Host defense against the tumor is poorly understood. A lymphoproliferative herpesvirus has been isolated from wild cottontail rabbits, and equine herpesvirus 3 transforms cultured embryonic hamster cells, which, when injected sc into newborn hamsters, result in a high incidence of malignant lymphoma. Herpesviruses have also been isolated from leukemic-prone strain 2 guinea pigs, lymphosarcomatous cows, and sheep with pulmonary adenomatosis. (28 references)

1817 MAREK'S DISEASE: EPIZOOTIOLOGY, CONTROL AND RELATIONSHIP TO ONCORNAVIRUSES. (Eng.) Purchase, H. G. (Agriculture Res. Service, BARC-West, Beltsville, MD 20705). *Bibl Haematol (Basel)* (43): 199-203; 1976.

Marek's disease (MD) is caused by a highly infectious herpesvirus that is transmitted via the environment. (Egg transmission is so rare, if it occurs at all, that it is unimportant). Host genetic and age resistance to infection appear to be mediated through cellular immune mechanisms. A highly successful vaccine has been developed for the prevention of MD. Vaccine-induced immunity may be mediated via cellular immunity to nonstructural virus-induced antigens on both tumor cells and infected cultured cells. The presence or expression of oncornavirus gs antigen or cell-associated helper factor is not necessary for the development of MD. Vaccination of commercial poultry is not associated with an increase in the incidence of infection with oncornaviruses or disease caused by oncornaviruses. MD, and its prevention by vaccination, is an excellent model for studying the pathogenesis of herpesvirus-induced tumors and for developing methods to control human cancer. In particular, protection against MD by virus-free membrane fractions is an excellent model for the immunoprophylaxis of human cancer. (35 references)

1818 EPIZOOTIOLOGY OF NATURAL INFECTION WITH BOVINE LEUKEMIA VIRUS. (Eng.) Olson, C. (Dept. Veterinary Science, Univ. Wisconsin, 1635 Linden Drive, Madison, WI 53706); Baumgartener, L. E. *Bibl Haematol (Basel)* (43): 255-259; 1976.

A brief epizootiological review of natural infection with bovine leukemia virus (BLV) since World War II is presented. Evidence for both vertical and horizontal transmission has been noted. Demonstration of BLV in lymphosarcoma materials was first reported in 1969. The virus produces lymphosarcoma in cattle and sheep and infects goats. Attempts to infect a large number of other animals and birds and to demonstrate a virus or antibodies have been negative. An enzootic occurrence of the adult form of lymphosarcoma (compared to the much less frequent and sporadic juvenile and skin forms) has been observed in Denmark, which suggests the possibility of different etiologies of the sporadic forms. Although neither virus antibody nor BLV can be demonstrated in the calf or thymic forms of bovine lymphosarcoma, experimental calves and sheep inoculated with such material have developed BLV infections and antibodies. (56 references)

1819 CHARACTERIZATION OF CHICKEN LEUKOSIS-SARCOMA VIRUS PROVIRAL SEQUENCES DETECTED IN HOST CELLS BY RNA-DNA HYBRIDIZATION. (Eng.) Neiman, P. E. (Univ. Washington Sch. Medicine, Seattle, WA 98195). *Bibl Haematol (Basel)* (43): 128-133; 1976.

The present status of analysis, by RNA-DNA hybridization and derivative techniques, of proviral sequences related to a series of representatives of the chicken leukosis-sarcoma complex is reviewed. Viruses that have been studied include RAV-0, an endogenous virus; PR-RSV-C and B77, sarcoma-producing viruses; ALV 5938, 5951, and RAV-1, leukosis viruses that produce lymphoma; and MAV-2(0), a leukosis virus that causes osteopetrosis. Hybridization studies suggested the presence of a complete or nearly complete endogenous provirus for RAV-0 in normal cells.

Similar studies revealed that the DNA of cells infected and transformed with RSV or MAV-2 exogenous viruses contained complete proviruses. Only a portion of the genome of the exogenous RNA tumor viruses is represented in the DNA of normal chicken cells at a very low reiteration frequency per cell. Competitive hybridization analyses indicated virtually complete competition between different sarcoma viruses and between the two-field ALV isolates. Also, RNA from RAV-0 competed almost completely with the labeled RNA from exogenous sarcoma and leukosis viruses for virus-related DNA sequences in normal chicken cells, indicating that the portion of the genome of exogenous oncogenic viruses detected in normal chicken DNA is composed, for the most part, of those sequences shared with the endogenous provirus of RAV-0. About 35% of the sequences of RSV RNA and 20% of ALV RNA forming hybrids with DNA from tumors induced by those viruses are unshared with RAV-0 and therefore are largely exogenous to the chicken genome. A difference of 15%-22% of the sequences of RNA from ALV, RSV, and MAV-20 in hybrids formed with DNA from virus-infected cells was demonstrated. About 15% of the endogenous provirus of RAV-0 could not be detected in the RNA of any of the exogenous oncogenic agents tested. The hypothesis is offered that the various classes of oncogenic viruses of the chicken leukosis-sarcoma complex may have arisen through specific recombinational events; for example, between a highly conserved ancestor of the endogenous provirus of RAV-0 and other sequences, perhaps of cellular origin, perhaps from another unrelated virus. (19 references)

1820 SV40 TRANSFORMATION OF MOUSE BRAIN CELLS: CRITICAL ROLE OF GENE A IN MAINTENANCE OF THE TRANSFORMED PHENOTYPE. (Eng.) Anderson, J. L. (Natl. Inst. Arthritis, Metabolism, Digestive Diseases, Natl. Insts. Health, Bethesda, MD 20014); Martin, R. G. *J Cell Physiol* 88(1): 65-76; 1976.

Brain cells derived from the NIH Swiss mouse strain were established in tissue culture. This strain was chosen because it was shown to be free of mousetropic AKR-type murine leukemia viruses. Astrocytic neuroglial cells, identified by morphology and staining properties, predominated. The brain cell culture was successfully transformed with SV40 wild-type virus and with a representative early (A239) and late (C219) mutant. When subjected to growth analysis, the A239 transformant displayed selective loss of six characteristics of the transformed phenotype at the restrictive temperature (40.5 C): doubling time, saturation density, ability to grow in low serum, efficiency of growth on plastic and on normal brain cell layers, and cloning in soft agar. Temperature shift experiments demonstrated the reversibility of the differences in saturation density. T-antigen was expressed at 33 C and 40.5 C. Alteration in uptake of 2-deoxyglucose was not a characteristic of the transformed phenotype. The cell lines may be of use in brain culture work and in studies on the mechanism of SV40 transformation. (27 references)

1821 THE ISOLATION AND CHARACTERIZATION OF DNA BINDING PROTEINS SPECIFIC FOR ADENOVIRUS INFECTED CELLS. (Eng.) van der Vliet, P.; Levine, A. J. In: *Tumor Virus-Host Cell Interaction.* Edited by A. Kolber. (New York: Plenum Press): pp. 197-216; 1975.

The structure and replication of adenovirus DNA isolated from virions of adenovirus types 2 and 5 (Ad2 and Ad5, respectively) are reviewed, and two adenovirus-infected cell-specific DNA binding proteins are characterized. Monolayer cultures of African green monkey kidney cells were infected with Ad5, and ^{3}H-leucine (10 μCi/ml) was added to the infected cells 2 hr later. A fraction of the protein extracts was examined by sodium dodecyl sulfate-polyacrylamide gel electrophoresis. Two prominent polypeptides, detected only in infected cells, were observed the molecular wt of which were estimated to be 72,000 and 48,000 daltons. Each was found to be present in amounts between 1-10 x 10^6 molecules/cell. The kinetics of synthesis of these two DNA binding proteins was investigated by labeling adenovirus-infected African green monkey kidney cells with ^{14}C-leucine for 4-hr periods at various times after infection, fractionating the protein extracts on DNA cellulose, and analyzing the proteins by electrophoresis. Both proteins were first detected at about 8 hr after infection and were synthesized at a maximum rate at 18 hr. Neither protein could be detected in preparations of purified virions. Both were detected in extracts prepared from cells infected with a DNA-negative temperature-sensitive mutant, Ad5 ts36, grown at the permissive or nonpermissive temperatures. Neither protein was detected in cell extracts prepared from cells infected with a DNA-negative temperature sensitive mutant Ad5 ts225 grown at the nonpermissive temperature. Thirty percent of the normal yield of these proteins was present in Ad5 ts225 infected cell extracts prepared at the permissive temperature. Both proteins bind to single-stranded DNA but not to double-stranded DNA or RNA. All of these properties closely resemble those of the previously described T-4 gene 32 product, but their function is not clear. (39 references)

1822 EVIDENCE FOR VIRUSES IN HUMAN NEOPLASIAS. (Eng.) Spiegelman, S. (Inst. Cancer Res., 99 Fort Washington Ave., New York, NY 10032). *Haematologica* 60(3): 339-372; 1975.

Several hypotheses explaining the cellular heritability of the cancer state were tested. DNA-RNA hydridizations revealed a pattern of specific RNAs in human tumors showing a remarkable concordance with the predictions deducible from the animal systems. Human breast cancer contained RNA homologous only to that of the murine mammary tumor virus (MMTV). Human leukemias, sarcomas, and lymphomas all contained RNA with sequence homology to the murine leukemia viruses (MuLV). RNA detected in all of the human neoplasias of high molecular weight (1 x 10^7 daltons) and encapsulated with a reverse transcriptase in particles having densities between 1.16 to 1.19 g/ml. Thus, three features diagnostic for the murine oncogenic viruses were satisfied by the particles found in human cancers. Recycling experiments showed that the DNA from human leukemic cells and from lymphomatous tissue contained particle-related sequences that could not be detected in normal DNA. This finding was further substantiated by studies with identical twins that showed that the leukemic twin contained particle-related sequences that could not be detected in the leukocytes of his identical healthy sibling. These results are inconsistent with hypotheses that require chromosomal transmission in the germ line of complete copies of the information required to produce malignancy and the associated virus particles. (44 references)

1823 CELL MARKER STUDIES OF HUMAN TUMORIGENESIS. (Eng.) Friedman, J. M. (Veterans' Admin. Hosp., Seattle, WA 98108); Fialkow, P. J. *Transplant Rev* 28: 17-33; 1976.

Findings obtained in cell marker studies of neoplasms are reviewed and related to the concept of immunological surveillance. Using two cell markers, glucose-6-phosphate dehydrogenase (G-6-PD) and surface immunoglobulin markers (μ and χ), it was found that all tumors in individual patients with Burkitt lymphoma appeared to be the progeny of a single malignant cell. A putative viral etiology of this tumor has been suggested, with Epstein-Barr virus (EBV) as the putative agent. The fact that, on their first encounter with this virus, different individuals may develop an asymptomatic infection, a self-limited lymphoproliferative state, or a lymphoproliferative malignancy is explainable by the likely possibility that additional factors participate in tumor formation associated with EBV. The specific chromosome alteration (an additional band in one chromosome 14) found in most Burkitt tumors may be a cytological correlate of a genetic alteration which permits escape from immunosurveillance. Early recurrences in Burkitt lymphoma patients appear to represent re-emergence of the original malignant clone, whereas late relapses may be due to the emergence of a new tumor line escaping immunosurveillance in predisposed patients. Although most benign and malignant tumors studied have clonal origin, multiple cell origin has been demonstrated for the neurofibromas in multiple neurofibromatosis, multiple trichoepitheloimata, and a colonic carcinoma. In each of two x-irradiated patients, acute lymphoblastic leukemia developed in more than one cell line; if in such cases the leukemia is of clonal origin, the findings would support the concept of immunological surveillance. It must be concluded that the findings with cell marker studies have provided no definite information about the fundamental importance of immunosurveillance. (84 references)

1824 STATUS OF IN VITRO CORRELATES OF CELLULAR IMMUNITY. IN VITRO CORRELATES OF CELL-MEDIATED IMMUNITY TO EXPERIMENTAL AND HUMAN LEUKEMIA. (Eng.) Herberman, R. B. (Natl. Cancer Inst., Bldg. 8, Room 118, 9000 Rockville Pike, Bethesda, MD 20014). *Bibl Haematol (Basel)* (43): 260-264; 1976.

Using an inhibition assay that permits definition of the specificity of the ^{51}Cr release cytotoxicity assay for cell-mediated immunity in the Gross virus-induced leukemia [(C58NT)D] system in W/Fu rats, the authors found the detected antigenic specificity to be distinct from any of those detected by humoral antibodies. The antigen was found only on rat cells and not on mouse cells transformed by Gross or other leukemia viruses, and it is believed to be related to the expression of rat endogenous type C virus (REV-SA-1). In the murine sarcoma virus system, cytotoxic lymphocytes of immune C57BL/6 mice react against an antigenic specificity distinct from any of the expected specificities (antigen MEV-SA-1). This antigen appears to be related to the expression of mouse endogenous type C virus. Using an ^{125}IUdR release cytotoxic assay, recent studies of cell-mediated immunity against a Friend virus-induced leukemia (FBL-3) have indicated reactivity against the FMR serologic specificity and also against MEV-SA-1. A further complexity in the analysis of cell-mediated immunity is that different types of effector cells can be involved, even with the same tumor system. In the (C58NT)D system, both progressors and regressors have transient T cell cytotoxic responses, but the responses of progressors are lower than those of regressors. In the growth inhibition assay, more reactivity is seen in progressors, where it seems to be associated with large tumors. In systemic adoptive transfer experiments in the MSV and FBL-3 systems, lymphocytes from regressors conferred considerably better protection against challenge with leukemic cells than did cells from progressors. Rechallenge of immune animals with tumor cells is associated with a strong cytotoxic reactivity that is rapidly developing but restricted to the area of challenge, indicating that animals have memory cells for cytotoxicity, but reexposure to antigen is necessary to generate reactivity. There are many analogies between these animal systems and human acute leukemia. Similar to the antigens on experimental leukemias, the antigens on human acute leukemia cells are heterogeneous and complex. (22 references)

1825 T AND B LYMPHOCYTES IN HUMANS: A REVIEW. (Eng.) Kersey, J. H. (Medical Sch., Univ. Minnesota, Box 609, Mayo Memorial Building, Minneapolis, MN 55455); Gajell-Peczalska, K. J. *Am J Pathol* 81(2): 446-447; 1975.

The biological and clinical characteristics of B and T lymphocytes in man are reviewed. The presence of immunoglobulin (Ig) on and within B lymphocytes has been the subject of much interest and some controversy. The percentage of human lymphocytes with membrane-associated Ig varies with the anatomic site, being only 1%-2% in the thymus and 30%-60% in the tonsil. Evidence suggests multiple sites of B-cell differentiation, while the thymus is thought to be the location of T-cell differentiation under the influence of thymic hormones. A second marker on B cells is the receptor that binds Ig's. A number of immunodeficiency diseases in humans involve either B or T lymphocytes. Abnormal T- and B-lymphocyte function has been demonstrated in a variety of human neoplasms. Drug-induced immunodeficiency states are associated with an increased incidence of cancer, particularly of the lymphoreticular system. Studies of lymphoreticular solid tumors and leukemias have been aided by the recent development of surface marker analysis of tumors. Most cases of chronic lymphatic leukemias carry Ig and are thus of apparent B-cell origin. Childhood lymphoid leukemias are often acute and involve T cells, while adult lymphoid leukemias are often chronic and involve B cells. In the mouse, lymphomas induced by viruses involve the thymus and T cells, while chemically induced lymphomas in certain strains of mice involve B cells. A small percentage of normal human lymphocytes carry surface markers characteristic of both T and B lymphocytes, along with a few lymphomas and leukemias. Unanswered questions and further studies are discussed. (50 references)

1826 DEVELOPMENT OF T AND B CELLS AND THEIR FUNCTIONAL INTERACTIONS. (Eng.) Cooper, M. D. (Univ. Alabama Medical Center, Birmingham, AL); Lawton, A. R. *Birth Defects* 11(1): 3-6; 1975.

The development of T and B cells, their functions, and immunoglobulin (Ig) deficiency diseases are reviewed. A two-stage discontinuous model of B cell differentiation is presented in which the first stage is concerned with the generation of multiple clones of B lymphocytes bearing surface Ig. In the second stage, antigens induce B lymphocytes via their surface antibodies to proliferate and to accomplish terminal plasma cell differentiation. T lymphocyte cooperation is needed to induce terminal differentiation by protein antigens. Observations of cells in the bursa of fabricius indicate that the order of B lymphocyte migration follows the sequence of their ontogeny and that the order of development of B cells can be explained by a sequential switch in expression of heavy chain genes. Another distinct feature of the first stage is the antigen-independent generation of B lymphocytes. The location of the bursa equivalent in mammals is still in doubt, but evidence indicates that gut-associated lymphoepithelial tissues serve this function. In assessing B cell development in patients, integrity of first stage development is implied by normal numbers and distribution of B lymphocytes bearing IgM, IgG, and IgA; the second stage is measured by normal development of plasma cells, antibody responses, and Ig levels. B lymphocytes and their plasma cell progeny can be distinguished by their synthesis rates, intracellular compartmentalization, and release rates of Ig. Use of surface markers (differentiation antigens and ability to form spontaneous rosettes with SRBC) in conjunction with evaluation by selective T cell stimulation by mitogens, cell-mediated immunity, and T cell production of lymphokines should allow more insight into T cell developmental abnormalities. T cells are heterogeneous in function and distribution, but it is not clear whether the subsets of T cells represent different stages in T cell differentiation or separate sublines. Recent evidence indicates the presence of a receptor on T cells for IgM antibody produced by B cells. (49 references)

1827 SUPPRESSION OF CELL-MEDIATED CYTOTOXICITY BY LYMPHOCYTES FROM TUMOR-BEARING ANIMALS. (Eng.) Hellstrom, I. (Fred Hutchinson Cancer Res. Center, Seattle, WA 98104); Hellstrom, K. E.; Kall, M. A.; Nelson, K.; Pollack, S. *Transplant Proc* 8(2): 255-264; 1976.

Two main sets of data were summarized in this review. In the first, experiments showed that lymphocytes from tumor-bearing mice did not kill cells of the respective tumor if they were cocultivated for 6 days, although they did kill the tumor cells if tested either immediately or after 3 days of cocultivation. The second body of data involved spleen cells from tumor-bearing mice that were cultivated in vitro; the culture supernatants were assayed for an effect on lymphocyte-mediated destruction of plated tumor cells. The spleen cultures were found to produce blocking factors, which were at least partially immunoglobins and which could specifically abrogate T cell-mediated tumor cell destruction in vitro. The production of blocking factors depended on a T cell function, as it was abolished if the spleen cells were incubated with anti-Thy-1 serum and restored if Thy-1 carrying cells were added again. It was speculated that these data could possibly have significance in the development of effective immunotherapy. (35 references)

1828 GROWTH REGULATION OF HUMAN ACUTE LEUKEMIA CELL POPULATIONS. (Eng.) Mauer, A. M.; Murphy, S. B. In: *Fundamental Aspects of Neoplasia.* Edited by A. A. Gottlieb; O. J. Plescia; D. H. L. Bishop. (New York: Springer-Verlag): pp. 389-399; 1975.

Evidence for growth regulation in leukemic cell populations, the nature of the regulatory mechanisms, and phases of the cell cycle in which regulatory factors might exert population control are reviewed. Simultaneous sampling of different marrow sites in a patient with acute lymphoblastic leukemia (ALL) reveals the same degree of proliferative activity in all sites, suggesting that the proportion of dividing and resting cells is under a systemic rather than local control. In a child with untreated ALL, the mitotic index and percent of proliferative blasts were unchanged for as long as 9 days, suggesting that the cell population was sensitive to some growth regulatory mechanism determining the proportions of dividing and resting cells. Attempts to relate proliferation to duration of leukemic cell growth by comparing the proliferative activity at diagnosis and during a subsequent relapse led to the conclusion that one mechanism for regulation is responsive to population density or to duration of malignant cell growth. Abnormal colony formation and abnormal colony-stimulating activity have been observed frequently in cells from patients with acute myeloblastic leukemia (AML), suggesting that AML represents a primary disturbance of cell maturation. In erythroleukemia, the abnormal erythroid precursors are still responsive to the control mechanisms of serum erythropoietin levels and the severity of the anemia. Factors such as cell density, body burden of leukemic cells, supply of oxygen and other nutrients, serum inhibitory or stimulatory substances, cell-cell contact and inductive interaction between stem cells, and the microenvironment may all influence the maintenance of leukemic relapse or remission. The specific growth rate of leukemic cell populations undergoes decay during growth, which may be due to cell loss or death, decrease in the growth fraction, and/or an increase in the generation time as growth continues. Once a cell initiates DNA synthesis it appears to be committed to progress through S, G_2, and M. It appears therefore that the cell after mitosis would be most susceptible to a growth regulatory mechanism affecting the proportion of resting and dividing cells. (18 references)

1829 BURKITT'S TUMORS: GENERAL CHARACTERISTICS AND COMMENTS CONCERNING THE IVORY COAST.

(Fre.) Bonhomme, J. (No affiliation given); Loubiere, R.; Bureau, J.-P.; Vilasco, J. *Med Afrique Noire* 22(7): 509-515; 1975.

Information concerning Burkitt's tumor, which is found primarily in the tropical regions of East Africa, is reviewed. As all cases have anti-Epstein-Barr virus antibodies, the lymphoma is apparently of this viral etiology. The proliferation of antibody-secreting lymphocytes and the hypergammaglobulinemia frequently found in this area apparently create a medium favorable to multiplication of the virus; in this way its oncogenic action is facilitated. The tumor generally appears in the maxillofacial and, less frequently, abdominal areas and is usually found in children between 4 and 8 yr; sex and racial background are not factors. Diagnosis is made by histological and cytological examinations of biopsies. Recommended treatment is repeated administration of cyclophosphamide. (34 references)

1830 BIOLOGY OF THE NEUROBLASTOMA CELL.

(Eng.) Pochedly, C. In: *Neuroblastoma*. Edited by C. Pochedly. (Acton, MA: Publishing Sciences Group, Inc.): pp. 181-203; 1976.

A review is presented of the in vivo and in vitro behavior of neuroblastoma cells, the association of the nerve growth factor (NGF) with neuroblastoma, and the presence in the cells of chromosomal abnormalities, which include multiple chromosomal breaks, aneuploidy, and double-minute chromatid bodies. Neuroblastoma cells are capable of undergoing differentiation and maturation in vitro, the latter being stimulated by factors such as x-rays, dibutyryl-cyclic AMP, prostaglandin E_1, and phosphodiesterase inhibitors. Both human and murine (C1300) neuroblastoma cells have been established as continuously multiplying cell lines. The implantation of C1300 cells in mice has been used as a model to study the treatment of neuroblastoma. Serum NGF is elevated in some childhood cases of neuroblastoma, but it is not produced by cultured neuroblastoma cells. The injection of NGF into children with disseminated neuroblastomas had no effect on the malignant course of the tumor, and it appears unlikely that NGF or antibody to NGF are causally related to growth or repression of neuroblastomas. (31 references)

1831 HISTOGENESIS AND PATHOLOGY OF NEUROBLASTOMA.

(Eng.) Pochedly, C.; Strauss, L. In: *Neuroblastoma*. Edited by C. Pochedly. (Acton, MA: Publishing Sciences Group, Inc.): 155-180; 1976.

The histological appearance of a neuroblastoma was first described by Virchow in 1864, but the complex embryological and histogenic origin of these tumors was not understood until about 50 yr later. Neuroblastomas originate from primitive anlage in the sympathetic nervous system. The embryological origin of sympathetic ganglia and, thus, of neuroblastomas, is from the neural crest. The primary cells of origin are the sympathogonia and sympathoblasts. Neuroblastoma, ganglioneuroblastoma, and ganglioneuroma constitute a histological spectrum. Neuroblastomas are composed of small, round, or polyhedral cells, with scant cytoplasm and a central, densely chromatic nucleus. However, the histological appearance may be quite variable due to cellular maturation. Rosette formation is a sign of differentiation. Ganglioneuroblastomas contain greater evidence of maturation, with areas resembling ganglioneuroma. The degree of relative histological maturity is slightly correlated with the prognosis. Ganglioneuromas are completely differentiated benign neoplasms. Other malignant tumors may resemble neuroblastoma and may be difficult to distinguish from neuroblastoma by histological study alone. Occasionally, study of the tumor by growth in vitro may provide the diagnosis. (27 references)

1832 ALTERNATIVE EXPLANATIONS OF THE DIFFERING BEHAVIOUR OF OVARIAN AND TESTICULAR TERATOMAS.

(Eng.) Erickson, R. P. (Univ. California Sch. Medicine, San Francisco, CA 94143); Gondos, B. *Lancet* 1(7957): 407-409; 1976.

Aspects of the clinical behavior of teratomas are presented that may be important in the etiology of malignant versus nonmalignant forms. First, the ages when malignant teratomas form in the ovary (children) and testis (adult) follow by a similar span of years the time of oogenesis (fetus) and spermatogenesis (onset at puberty) and, specifically, follow by less than a decade the periods of active mitosis and meiosis during which germ cells are interconnected by intercellular bridges. Second, ovarian teratomas may be viewed as parthenogenically activated oocytes, while testicular teratocarcinomas may represent postmeiotic fusion events more comparable to fertilization. The malignant potential in the latter case could relate to fundamental differences in male and female germ plasm. Third, the fact that malignant teratomas are easily produced by transplanting early embryos to extrauterine sites (although there is a loss of malignancy with differentiation within a tumor or when malignant cells are injected into preimplantation embryos and contribute cells to a variety of normal tissues) suggests that the malignant potential of teratomas has to do with gene control rather than mutational events. (25 references)

1833 ORIGIN OF TERATOMAS (Letter to Editor). (Eng.) Riley, P. A. (Univ. Coll. Hosp. Medical Sch., London WC1E 6JJ, England); Sutton, P. M. *Lancet* 1(7960): 642-643; 1976.

An explanation for the malignancy of testicular but not ovarian teratomas in adults and the observed reverse of this situation in children is suggested. It is assumed that tumorigenesis is due to a mutation at the growth controlling locus. At the time the germ cells are entering the testes, such a mutation would be transmitted as a heterozygous defect in the mitotic progeny and result in a benign tumor. In contrast, cells undergoing the mutation at the premeiotic phase would generate homozygous malignant tumors. In the female infant, heterozygous cells not entering meiosis would result in benign tumors, while a heterozygous oogonium entering meiosis would result in a homozygous malignant tumor. In the adult female, mutations would accrue to primary oocytes before meiosis is completed, resulting in benign tumors. (13 references)

1834 NONSURGICAL TREATMENT OF HUMAN BENIGN PROSTATIC HYPERPLASIA. (Eng.) Scott, W. W. (The Johns Hopkins Hosp., Baltimore, MD); Coffey, D. S. *Vitam Horm* 33: 439-465; 1975.

Recent developments in the nonsurgical treatment of benign prostatic hyperplasia (BPH) are highlighted. While early studies tended to suggest that castration was effective, more recent, better controlled studies largely negate this impression. Treatment with estrogens, androgens, combined estrogens and androgens, and with various antiandrogens and progestational agents have led to the conclusion that these approaches are ineffective. The canine model of BPH bears several significant differences from human BPH. Histologically, canine BPH consists of epithelial hyperplasia with papillary growth. Furthermore, BPH in the dog is sensitive to hormone treatment. Administration of testosterone to castrated dogs does not produce hyperplasia, but once the disease has developed, castration ablates it and administration of testosterone to the castrated dog reverses this. Presumably other factors of the testis are required for the development of canine BPH. As more knowledge of the etiology of this disease accumulates, attention may be directed toward prevention. (53 references)

1835 OVARIAN TUMORS. (Eng.) Greenwald, E. F. (Temple Univ. Health Sci. Center, Philadelphia, PA). *Clin Obstet Gynecol* 18(4): 61-86; 1975.

The classification, pathophysiology, etiology, diagnosis, and treatment of ovarian tumors are discussed. These tumors must be classified as mesothelial tumors, mesenchymal tumors, mixed mullerian tumors, germ cell tumors, mixed mesenchymal-germ cell tumors, and metastatic tumors. There has been no documentation of a causative factor for any of the histologic forms of ovarian cancer, but the incidence of such tumors increases with nutrition and socioeconomic status, the frequency of ovulation, the presence of endogenous irritants such as the endometrial and tubal secretions and menstrual fluid, gonadotropin stimulation, a family history of ovarian tumors, a personal history of other primary neoplasms, immunodeficiency, radiation exposure, and various genetic abnormalities and hereditary syndromes. About 30% of patients are asymptomatic at the time of detection of the neoplasm, generally by palpation of a pelvic or abdominopelvic mass. Presenting problems in symptomatic patients include a painless and rapid increase in abdominal girth secondary to the accumulation of peritoneal fluid, pelvic pressure and pressure symptoms, and menstrual aberrations. Hysterectomy and bilateral salpingo-oophorectomy are appropriate therapy for benign neoplasms in patients beyond the age of 35 yr. The management of malignant ovarian tumors is dependent upon stage, histologic type, degree of differentiation, age, parity, and desire for future childbearing. Complete or partial surgery followed by radiation or chemotherapy are recommended for stages Iai-III, and stage IV should be treated by cytotoxic chemotherapy. Aggressive management of metastatic ovarian tumors and pelvic masses during pregnancy is indicated. Despite the poor prognosis of advanced cancer, aggressive management may achieve an occasional salvage. However, the major proportion of the physician's time and effort expended in dealing with ovarian cancer is devoted to the palliative management of the patient and emotional support of the family. (48 references)

1836 PRIMARY CARCINOMA OF THE GALLBLADDER: STUDY OF 108 CASES. (Eng.) Richard, P. F. (Hotel-Dieu Hosp., Montreal, PQ H2W 1T8, Canada); Cantin, J. *Can J Surg* 19(1): 27-32; 1976.

Of 17,698 cases of cancer, 108 cases of primary carcinoma of the gallbladder were recorded over a 22-yr period. A review indicated that primary gallbladder carcinoma was mainly a disease of women older than 60 yr; abdominal pain occurred in most patients and jaundice in more than half, and weight loss was also common; laboratory and radiographic features were nonspecific; the diagnosis was made or strongly suspected in only one-quarter and, moreover, in many patients the disease was not discovered until pathological examination was conducted postoperatively. The carcinoma spread first to the regional lymph nodes along the cystic and common ducts and to the liver at the gallbladder fossa. Further spread was mainly to the liver, lesser and greater omentum, and gastroduodenal area. Resection was possible in 41 of the 93 patients who underwent an operation, but treatment was conservative because it was palliative in 20; in 20 of the other 21 who underwent cholecystectomy the disease was not recognized at operation. Overall, the 5-yr survival rate was 6.4%; for those who underwent curative resection it was 33%; and for patients without visible metastases at operation the mean survival was 3 yr. Improvement in survival will come from more frequent recognition of the cancer at operation so that cholecystectomy, wedge resection of liver, and resection of regional lymph nodes may be performed. (24 references)

1837 GEOPREVALENCE AND ETIOLOGY OF CANCER. (Eng.) Burdette, W. J. (Univ. Texas Medical Sch. at Houston, Houston, TX). *Bull Soc Int Chir* 34(5): 345-354; 1975.

The global prevalence of cancer provides a mosaic with a pattern characteristic for each type of cancer. Causal relationships that have already been demonstrated include the relationship between UV irradiation and skin cancer in whites, between x, gamma, or other irradiation and leukemia, and between certain occupational hazards, such as asbestos and lung cancer. However, a wide discrepancy exists between the incidence and mortality of some types of cancer in different geographic locations. Primary liver carcinoma presents a greater diversity in incidence and mortality than any other type. Carcinomas of the esophagus and stomach have wide distributions, but only in a few countries are the incidences very high. Cancer of the colon and rectum appear to be most common in urban areas and may be directly related to the quality of the diet. All of these cancers appear to have multiple etiologies, as evidenced by their unequal distribution. Occasional clusters of neoplasms have also been noted, which supports the thesis of viral etiology. Some of the questions raised by these epidemiological findings may be answered by better classifications of neoplasms, more widespread reporting, and well-designed prospective studies of human disease requiring the acquisition of data on metabolic, dietary, occupational, and other specific determinants. (34 references)

1838 MODELS OF CARCINOGENESIS AS AN ESCAPE FROM MITOTIC INHIBITORS. (Eng.) Bell, G. I. (Los Alamos Scientific Lab., Los Alamos, NM 87544). *Science* 192(4239): 569-572; 1976.

A simple model of mitotic inhibition by diffusible factors is presented, in which the competition between normal and cancer cells strongly depends on the type of tissue involved and on the mechanism whereby the cancer cells escape regulation. Cancer cells may escape regulation by failing to either recognize or secrete inhibitors. Probabilities and expected times for reaching a critical clone size were calculated for those cancer cells which fail to secrete inhibitors. Patterns of proliferation in this model depend on whether the inhibitor concentration is locally or systemically determined. (30 references)

1839 CANCER SURVEILLANCE WITH PARTICULAR REFERENCE TO THE USES OF MORTALITY DATA. (Eng.) Griffith, G. W. (18 Victoria Terrace, Beaumaris, Anglesey, Gwynedd, North Wales). *Int J Epidemiol* 5(1): 69-76; 1976.

The uses and accuracy of mortality and morbidity data in cancer surveillance are reviewed. Morbidity information from cancer registration and mortality data based on death certification complement each other, and both are necessary for adequate surveillance. In many ways, mortality data are sufficiently accurate and specific to reveal major trends and differences. The mean corrected 5-yr survival rates for some 35 tumors are presented. Relative frequencies may provide information of value to cancer surveillance when rates cannot be computed because the available set of cancer cases or deaths cannot be related to a defined population. Time lapses are operative in both morbidity and mortality figures because of the time interval between onset and death. The method of cohort studies has been applied to cancer mortality. (34 references)

1840 CELL BIOLOGY: CELL SURFACES AND THE REGULATION OF MITOSIS. (Eng.) Marx, J. L. (No affiliation given). *Science* 192(4238): 455-457; 1976.

Current knowledge concerning the relationship of the cell membrane to the control of mitosis is reviewed. Alterations in the spatial arrangements of membrane components may be signals involved in the control of mitosis, mobility, and interaction. There is evidence that microtubules and microfilaments regulate the distribution and mobility of membrane components. The production of caps on cells when antibodies bind to surface immunoglobulins, an energy-requiring process, is inhibited by concanavalin A and cytochalasin B. Local anesthetics also produce a similar effect by disrupting the microtubules and microfilaments. Normal cells are typically flat during growth on a surface, with bundles of microfilaments under the surface at the points of contact. Virally transformed cells, in contrast, are round throughout their lifetimes and lack these bundles. (4 references)

1841 INDUCTION OF TUMOURS BY CHEMICALS. (Eng.) Della Porta, G. (Instituto Nazionale per lo Studio e la Cura dei Tumori, Milan, Italy). *Int Union Cancer Tech Rep Ser* 20: 76-81; 1975. (6 references)

1842 METABOLIC ASPECTS OF CHEMICAL CARCINOGENESIS. (Eng.) Magee, P. N. In: *Host Environment Interactions in the Etiology of Cancer in Man. Proceedings of a Meeting Held at Primosten, Yugoslavia, 27 August-2 September 1972.* Edited by R. Doll, I. Vodopija, and W. Davis. International Agency for Research on Cancer. (Lyon, France): pp. 213-221; 1973. (50 references)

1843 METABOLIC ASPECTS OF HOST-ENVIRONMENTAL RELATIONSHIPS: AN OVERVIEW. (Eng.) Higginson, J. In: *Host Environment Interactions in the Etiology of Cancer in Man. Proceedings of a Meeting Held at Primosten, Yugoslavia, 27 August-2 September 1972.* Edited by R. Doll, I. Vodopija and W. Davis. International Agency for Research on Cancer. (Lyon, France): pp. 201-212; 1973. (50 references)

1844 ENVIRONMENTAL HEALTH ASPECTS OF FUNGICIDES. I. DITHIOCARBAMATES. (Eng.) Fishbein, L. (Natl. Center for Toxicological Res., Jefferson, Arkansas). *J Toxicol Environ Health* 1(5): 713-735; 1976. (103 references)

1845 UTILITY OF *DROSOPHILA* FOR DETECTION OF POTENTIAL ENVIRONMENTAL MUTAGENS. (Eng.) Zimmering, S. (Div. Biological Medical Sciences, Brown Univ., Providence, RI 02912). *Ann NY Acad Sci* 269: 26-33; 1975. (52 references)

1846 MODIFYING FACTORS IN RAT MAMMARY GLAND CARCINOGENESIS. (Eng.) Shellabarger, C. J. (Upton, NY: Brookhaven Natl. Lab.): 27 pp.; 1975. (27 references)

1847 CANCERS OTHER THAN LEUKEMIA. (Eng.) Beebe, G. W. (Radiation Effects Res. Foundation, Hiroshima, 730, Japan); Kato, H. *J Radiat Res* 16(Supplement): 97-107; 1975. (53 references)

1848 SKIN CANCER: 300,000 NEW CASES IN 1976. (Eng.) Anonymous (No affiliation given). *JAMA* 235(17): 1823, 1828; 1976. (1 reference)

1849 INVESTIGATORS STUDY 'LONG' AND 'SHORT' OF ULTRAVIOLET RADIATION EFFECTS. (Eng.) Anonymous (No affiliation given). *JAMA* 235(17): 1831; 1976. (No references)

1850 HERPESVIRUS AND CANCER OF THE UTERINE CERVIX. (Eng.) Anonymous (No affiliation given). *Br Med J* 1(6011): 671-672; 1976. (19 references)

1851 HERPES SIMPLEX VIRAL LATENCY--A REVIEW. (Eng.) Stevens, J. G. In: *Oncogenesis and Herpesvirus II. Part 2: Epidemiology, Host Response and Control. Proceedings of a Symposium held in Nuremburg, Federal Republic of Germany, 14-16 October 1974.* International Agency for Res. on Cancer. (Lyon, France): pp. 67-71; 1975. (33 references)

1852 DISCUSSION SUMMARY. (Eng.) Becker, Y. In: *Oncogenesis and Herpesvirus II. Part 1: Biochemistry of Viral Replication and In Vitro Transformation. Proceedings of a Symposium held in Nuremburg, Federal Republic of Germany, 14-16 October 1974.* International Agency for Res. on Cancer. (Lyon, France): pp. 111-113; 1975. (No references)

1853 PERSISTENCE OF HERPESVIRUS NUCLEIC ACID IN NORMAL AND TRANSFORMED HUMAN CELLS--A REVIEW. (Eng.) zur Hausen, H.; Schulte-Holthausen, H. In: *Oncogenesis and Herpesviruses II. Part 1: Biochemistry of Viral Replication and In Vitro Transformation. Proceedings of a Symposium held in Nuremburg, Federal Republic of Germany, 14-16 October 1974.* International Agency for Res. on Cancer. (Lyon, France): pp. 117-123; 1975. (18 references)

1854 MALIGNANT TRANSFORMATION BY HERPESVIRUSES. (Eng.) Rapp, F. In: *Tumor Virus-Host Cell Interaction.* Edited by A. Kolber. (New York: Plenum Press): pp. 397-414; 1975. (52 references)

1855 DNA AND RNA TUMOR VIRUSES--MOLECULAR EVENTS OF VIRAL REPLICATION AND CELL TRANSFORMATION AND ROLE IN HUMAN CANCER. (Eng.) Green, M. In: *Cancer Biology. I. Induction, Regulation, Immunology and Therapy. Based on a Series of Lectures Presented at the Given Institute of Pathobiology in Aspen, Colorado, July 1974.* Edited by R. R. Pascal, F. Silva and D. W. King. (New York: Stratton Intercontinental Medical Book Corp.): pp. 10-23; 1976. (16 references)

1856 SEXUAL REPRODUCTION AND PARENT-OFFSPRING CONFLICT IN THE RNA 'TUMOUR' VIRUS/HOST RELATIONSHIP: IMPLICATIONS FOR VERTEBRATE ONCOGENE EVOLUTION. (Eng.) Manning, J. T. (Dept. Zoology, Univ. Liverpool, Liverpool, England). *J Theor Biol* 55(2): 397-413; 1976. (65 references)

1857 STUDIES OF SV40 DNA REPLICATION. (Eng.) Fareed, G. C.; Salzman, N. P. In: *Tumor Virus-Host Cell Interaction.* Edited by A. Kolber. (New York: Plenum Press): pp. 13-19; 1975. (26 references)

1858 SERO-EPIDEMIOLOGY OF THE EPSTEIN-BARR VIRUS: PRELIMINARY ANALYSIS OF AN INTERNATIONAL STUDY-A REVIEW. (Eng.) De-The, G.; Day, N. E.; Geser, A.; Lavoue, M. F.; Ho, J. H. C.; Simons, M. J.; Sohier, R.; Tukei, P.; Vonka, V.; Zavadova, H. In: *Oncogenesis and Herpesvirus II. Part 2: Epidemiology, host Response and Control. Proceedings of a Symposium held in Nuremberg, Federal Republic of Germany, 14-16 October 1974.* International Agency for Res. on Cancer. (Lyon, France): pp. 3-16; 1975. (19 references)

1859 INFLUENCE OF IMMUNOLOGICAL STATUS ON ACQUIRED SUSCEPTIBILITY. (Eng.) Mitchison, N. A. In: *Host Environment Interactions in the Etiology of Cancer in Man. Proceedings of a Meeting Held at Primosten, Yugoslavia, 27 August-2 September 1972.* Edited by R. Doll, I. Vodopija, and W. Davis. International Agency for Research on Cancer (Lyon, France): pp. 275-284; 1973. (26 references)

1860 INFLUENCE OF IMMUNOLOGICAL REACTIONS ON CARCINOGENESIS. (Eng.) Makela, O. In: *Host Environment Interactions in the Etiology of Cancer in Man. Proceedings of a Meeting Held at Primosten, Yugoslavia, 27 August-2 September 1972.* Edited by R. Doll, I. Vodopija, and W. Davis. International Agency for Research on Cancer. (Lyon, France): pp. 285-290; 1973. (33 references)

1861 THE NUDE MOUSE: A MODEL OF DEFICIENT T-CELL FUNCTION. (Eng.) Pelletier, M. (Dept. Pathology, Univ. Montreal, Montreal, Quebec, Canada); Montplaisir, S. *Methods Achiev Exp Pathol* 7: 149-166; 1975. (87 references)

1862 TUMOR ANTIGENS AND TUMOR-HOST RELATIONSHIPS. (Eng.) Baldwin, R. W. (Cancer Res. Campaign Labs., Univ. Nottingham, Univ. Park, Nottingham NG6 2RD, England); Price, M. R. *Annu Rev Med* 27: 151-163; 1976. (74 references)

1863 TUMOURS OF THE BASE OF THE SKULL. (Eng.) Bingas, B. In: *Handbook of Clinical Neurology. Tumours of the Brain and Skull, Part II.* Edited by P. J. Vinken and G. W. Bruyn. (New York: American Elsevier Publishing Co., Inc.): vol. 17, pp. 136-233; 1974. (1089 references)

1864 STATISTICAL ASPECTS OF SPINAL CORD TUMORS. (Eng.) Alter, M. In: *Handbook of Clinical Neurology. Tumours of the Spine and Spinal Cord, Part I.* Edited by P. J. Vinken and G. W. Bruyn. (New York: American Elsevier Publishing Co., Inc.): vol. 19, pp. 1-22; 1975. (89 references)

1865 CUTANEOUS CANCER. (Eng.) Everall, J. D. (Royal Marsden Hosp., London, England). *Practitioner* 216(1292): 167-173; 1976. (3 references)

1866 BURKITT'S LYMPHOMA. (Fre.) Poitout, D. (U.E.R. de Medecine et Sante Tropicales, Marseille, France). *Med Afrique Noire* 22(8-9): 573-579; 1975. (No references)

1867 LETTER TO THE EDITOR. (Eng.) Simpson, J. L. (Northwestern Univ. Sch. Medicine, Chicago, IL); Photopulos, G. *Clin Genet* 9(3): 380-381; 1976. (21 references)

1868 LETTER TO THE EDITOR. (Eng.) Gustavson, K.-H. (Univ. Hosp., S-901 85 Umea, Sweden). *Clin Genet* 9(3): 381-382; 1976. (2 references)

1869 OVARIAN CONSERVATISM. (Eng.) Underwood, P. B., Jr. (Medical Univ. South Carolina, 80 Barre St., Charleston, SC 29401). *South Med J* 69(4): 405-408; 1976. (40 references)

1870 IMPAIRMENT OF COAGULATION FUNCTION DURING AFLATOXICOSIS IN YOUNG CHICKENS. (Eng.) Doerr, J. A. (Dept. Poultry Science, North Carolina State Univ., Raleigh, NC 27607); Wyatt, R. D.; Hamilton, P. B. *Toxicol Appl Pharmacol* 35(3): 437-446; 1976.

In response to reports of hemorrhagic episodes in chickens during aflatoxicosis, 3-wk-old broiler chickens were fed dietary aflatoxin (0, 0.625, 1.25, 2.5, 5.0, and 10 μg/g of feed) and tested for specific coagulation responses. Tissue thromboplastin was found to possess two active components, one of which was lost during aflatoxicosis. Thromboplastin protein content was unaltered but lipid content was depressed at 10 μg/g. Factors VII and V activities and fibrinogen were reduced at 2.5 μg/g and above. Factor X activity was depressed at 5.0 and 10 μg/g. Prothrombin, the most sensitive factor tested, was reduced by 0.625 μg/g, the lowest dose fed. Therefore, the hypothesis that aflatoxin reacts primarily on DNA-dependent RNA polymerase needs modification to embrace these findings. In addition, clot retraction in whole blood was measured, and it was found to increase with growth-inhibitory levels of aflatoxin. These data suggest that severe impairment of extrinsic and common clotting pathway functions occurs during aflatoxicosis in the chicken and that prothrombin is primarily affected during this coagulopathy.

1871 TUMOR INDUCTION BY A SINGLE SUBCUTANEOUS INJECTION OF STERIGMATOCYSTIN IN NEWBORN MICE. (Eng.) Fujii, K. (Sch. Medicine, Univ. Tsukuba, Ibaraki, Japan); Kurata, H.; Odashima, S.; Hatsuda, Y. *Cancer Res* 36(5): 1615-1618; 1976.

Sterigmatocystin, a mycotoxin produced by *Aspergillus versicolor*, *Aspergillus sydowi*, *Aspergillus nidulans*, and a species of *Bipolaris*, was given to newborn BALB/c x DBA/2 F_1 ($CD2F_1$) mice by a single sc administration. In an acute toxicity study, the maximum tolerated dose of sterigmatocystin was 5 μg/g body weight. In a chronic study, a single sc injection of 5, 1, or 0.5 μg/g body weight gave rise to high incidences of lung and liver adenomas when the animals were killed at the end of 1 yr. The incidence of both tumors in mice at the 5-μg/g dose was statistically significant, and the incidences of lung tumor in female mice and of liver tumor in male mice at the 1-μg/g dose were also statistically significant, compared with tumors in control mice. Two malignant lymphomas and one adenoma of the submaxillary gland were also induced in treated mice, in contrast to a zero incidence in vehicle control mice. These results confirm that a small quantity of sterigmatocystin induces tumors of lung and liver and that the dose of sterigmatocystin is related to the incidence of tumors in mice.

1872 AFFECT OF AFLATOXIN B_1 ON ADENYL CYCLASE AND CYCLIC AMP PHOSPHODIESTERASE ACTIVITIES IN RAT LIVER AND KIDNEY. (Eng.) Prasanna, H. R. (Vallabhbhai Patel Chest Inst., Univ. Delhi, Delhi 110007, India); Ramakrishna, V.; Gupta, S. R.; Viswanathan, L.; Venkitasubramanian, T. A. *Indian J Biochem Biopsy* 12(3): 207-208; 1976.

The possibility of aflatoxin B_1 acting through the second messenger cyclic AMP was investigated by measuring the adenyl cyclase and cyclic AMP phosphodiesterase levels in the liver and kidney homogenates of aflatoxin-treated male albino Wistar rats. Administration of aflatoxin caused a decrease in the activity of adenyl cyclase in the kidney and an increase in the activity of phosphodiesterase in the liver and kidney. These results suggest that in the liver and kidney, levels of cyclic AMP are lowered by treatment with aflatoxins and this may be related to the carcinogenic effect of the aflatoxins. It thus appears that some of the biological effects of aflatoxin B_1 are mediated through cyclic AMP.

1873 SOME EFFECTS OF ACUTE AND CHRONIC DOSING WITH AFLATOXIN B_1 ON RAT LIVER NUCLEI. (Eng.) Neal, G. E. (Medical Res. Council Labs., Woodmansterne Road, Carshalton, Surrey, England); Godoy, H. M.; Judah, D. J.; Butler, W. H. *Cancer Res* 36(5): 1771-1778; 1976.

The changes occurring in rat liver nuclei as a result of the chronic and acute administration of aflatoxin B_1 were studied. The nuclei were resolved into populations of differing ploidy by means of centrifugation in a zonal rotor. Chronic feeding of the toxin to weanling rats prevented the development of the predominant tetraploid hepatocyte nuclear population, which normally takes place during maturation. Increased populations of diploid and octaploid hepatocyte nuclei were observed. Chronic feeding of the toxin to adult animals also caused a reduction in the tetraploid population already established and, again, led to increased numbers of diploid and octaploid nuclei. Once an abnormal nuclear population was established by feeding the toxin, it persisted until the development of hepatocarcinoma (if a 6-wk carcinogenic feeding regimen was used). The hepatomas have diploid nuclei. Labeling hepatic RNA and DNA in vivo indicated that feeding the toxin causes a reversion to the immature distribution of DNA synthesis among the nuclear population, with little effect on the pattern of distribution of RNA synthesis. Acute administration of aflatoxin to adult rats also caused a reduction in the size of the tetraploid population, with increased proportions of diploid, octaploid, and higher ploidy nuclei.

1874 NUCLEAR INCLUSIONS AND OTHER ULTRASTRUCTURAL ASPECTS IN THE LIVER OF ANIMALS TREATED WITH N-2-ACETYLAMINOFLUORENE. (Eng.) Dorbe, M.-A. (Lab. Biochemistry and Electron Microscopy, 'V. Babes' Inst., Bucharest, Romania); Moraru, I.; Cotutiu, C.; Motoc, F. *Pathol Eur* 11(1): 63-68; 1976.

Two groups of 300 male Wistar rats (80-120 g) were given N-2-acetylaminofluorene (N-AAF) in oily solutions containing two different doses: one group received 0.7 mg three times a week and the second, 0.25 mg/day. The rats were killed at 3, 4, 5, 7, 9, 10, and 14 mo. The fine structure of the nuclei isolated from the liver was examined by electron microscopy. After the first 3 to 4 mo, the heterochromatin became uniformly distributed throughout the nucleus, with dissociation of the nucleolus-associated heterochromatin. At longer intervals (7 mo), evidence of various types of inclusions, chiefly granular viruslike bodies, was found. Subsequently, the frequency of inclusions diminished but the liver cell nucleus remained large, with numerous large nucleoli. This suggests that the increase in the nuclear and nucleolar volume is due to accumulation of synthesis products and from a disorder of nucleocytoplasmic exchanges.

1875 PHORBOL AS A POSSIBLE SYSTEMIC PROMOTING AGENT FOR SKIN CARCINOGENESIS. (Eng.) Armuth, V. (Wiezmann Inst. Science, Rehovot, Israel); Berenblum, I. *Z Krebsforsch* 85(1): 79-82; 1976.

To determine if the inability of unesterified phorbols to promote agents for skin carcinogenesis after repeated application may be due to inadequate doses, twentyfold higher doses were used. Random-bred ICR mice received 0.2 ml ip twice a week for 25 wk (cumulative dose: 200 mg/mouse) of 12-O-tetradecanoylphorbol-13-acetate (TPA). The yield of papillomas was of only borderline significance. If this result is taken as positive, the unesterified phorbol must still be considered only a weak inducer of skin carcinogenesis. The general activity of TPA and its analogs is apparently dependent on both the type of side chains and their position on the phorbol molecule. The overall weakness of their carcinogenic activity may be due to the fact that, because of their water-solubility, the molecules cannot penetrate the skin.

1876 TRANSMATERNAL VARIATION OF THE BERENBLUM EXPERIMENT WITH NMRI-MICE. TUMOR INITIATION WITH DMBA VIA MOTHERS MILK FOLLOWED BY PROMOTION WITH THE PHORBOL ESTER TPA. (Eng.) Goerttler, K. (Institut fuer Experimentelle Pathologie, Deutsches Krebsforschungszentrum, Im Neuenheimer Feld 280, D6900 Heidelberg 1, W. Germany); Lochrke, H. *Virchows Arch* [*Pathol Anat*] 370(2): 97-102; 1976.

Three groups of mother NMRI mice received the following treatments: dimethylbenzanthracene (DMBA), 2 mg/kg body weight in vegetable oil, six mice; 4 mg/kg body weight in vegetable oil, six mice; or just vegetable oil once a day, five mice; the doses were given intragastrically once a day from the 2nd to the 22nd day after birth. The mothers and the offspring were observed for tumors. Some of the animals received 12-O-tetradecanoyl-phorbol-13-acetate (TPA) on the skin of the back twice weekly for 40 applications. The results show that DMBA, which is applied transmaternally via the mothers milk, can initiate tumor cells in the F-1 generation. Subsequent application of the tumor promoter TPA to the back skin of the young animals induced the formation of skin papillomas and carcinomas. Animals treated according to this scheme also developed malignant neoplasms in the other organs. Control animals treated with vegetable oil only rarely developed tumors, whereas treatment with TPA alone had no effect. The results suggest that the transfer of carcinogens in human milk should be considered in addition to transplacental carcinogen transfer as a potential hazard to the developing human infant.

1877 STUDIES ON EXPERIMENTAL FORMATION OF OVARIAN TUMORS: ESPECIALLY, THE DISCUSSION OF THE DEVELOPING PROCESS OF OVARIAN TUMORS FOLLOWING AN APPLICATION OF DMBA. (Eng.) Kato, T. (Dept. Obstetrics Gynecology, Kurume Univ. Sch. Medicine, Kurume 830, Japan); Yakushiji, M.; Tsunawaki, A.; Ide, K.; Hirose, N.; Araki, S.; Abe, M. *Kurume Med J* 22(3): 169-176; 1975.

The histogenetic process of experimental ovarian tumors induced by a chemically carcinogenic substance, 9,10-dimethyl-1,2-benzanthracene (DMBA) in female Wistar rats was studied. Morphologically, the induced tumors could be classified in two groups: adenocarcinoma and sarcoma. A particular pattern of histogenetic process in these tumors was demonstrated by analyzing changes induced by DMBA during staged intervals. When treated with DMBA, an inflammatory change occurred around the region of a silk thread insertion; and subsequently, connective tissues proliferated. In the following stages, a layer of epithelial cells which constitute (a) glandular cysts of various sizes and (b) interstitial connective tissue, proliferated around them, presenting the findings of fibroadenoma. This fibroadenoma provided a basic type from which two different histogenetic processes bifurcated. In one direction, cystic components dominated and proceeded toward adenocarcinoma, and in the other, connective tissue proliferation prevailed to form a sarcoma. The process toward adenocarcinoma is of much interest because of its clinical incidence. Inclusion cysts appeared to play an important role in the developmental process, which should be of special interest when compared with various reports on the histogenesis of human adenocarcinoma.

1878 HORMONAL EFFECT ON SEXUAL REPRODUCTION AND TUMOR GROWTH. (Eng.) Yang, W. H. (Taipei Medical Coll., Formosa). *J Formosan Med Assoc* 74(10): 630-633; 1975.

The effects of hormones on lordosis and ovulation in hamsters, on the growth of breast tumors in dimethylbenzanthracene (DMBA)-treated hypophysectomized rats, and on the growth and structure of transplantable Leydig cell tumors in rats were studied. In hypophysectomized rats, daily administration of either 1 mg bovine growth hormone (BGH) or 2 mg prolactin in addition to 10 mg DMBA iv was effective in inducing breast tumors in 57% and 83%

of the rats tested, respectively. Female rats with breast tumors induced by DMBA were treated with hypophysectomy and daily injections of 2 mg ovine prolactin or daily injections of 0.4 mg BGH. Controls were given hypophysectomy only or left intact. Both the growth hormone and the prolactin were effective in promoting tumor growth. Mammary tumors transplanted to hypophysectomized rats showed better tumor growth. Mammary tumors transplanted to hypophysectomized rats sc were stimulated by both hormones during replacement therapy, but intact rats showed better tumor growth. Mouse Leydig cell tumors were capable of growth after transplantation to hypophysectomized mice and intact mice treated with rabbit antiserum to luteinizing hormone (LH). LH (200 g), prolactin (1 mg), or BGH (1 mg) all effectively enhanced tumor growth (by 176%, 179%, and 185%, respectively, in comparison to controls). Tumor cells growing in intact mice had a sparse smooth endoplasmic reticulum. LH induced proliferation of this organelle. Lordosis, ovulation, implantation, and embryonic development were all under the control of hormone action in the hamster.

879 CELL CYCLE-RELATED HORMONE CARCINOGEN INTERACTION DURING CHEMICAL CARCINOGEN NDUCTION OF NODULE-LIKE MAMMARY LESIONS IN ORGAN ULTURE. (Eng.) Lin, F. K. (Inst. Botany, Academia inica, Nankang, Taipei, Taiwan, China 115); Banerjee, M. R.; Crump, L. R. *Cancer Res* 36(5): 1607-1614; 976.

he immature mammary glands of BALB/c female mice ere treated with 7,12-dimethylbenz[a]anthracene MBA, 2 μg/ml, or 3-methylcholanthrene (10 μg/ml) or a 24 hr period at different times during the nitial 6 days of lobuloalveolar growth in hormone-upplemented organ culture. Nodule-like alveolar esions (NLAL) were detectable in 80% of the glands reated with DMBA (49% in 3-methylcholanthrene-treated lands) in medium containing insulin, prolactin, ldosterone, and cortisol. No NLAL were present in imethyl sulfoxide-treated control glands cultivated ith the same hormones. The hormone combination of nsulin plus prolactin plus cortisol was unfavorable or NLAL induction by DMBA, and the combination of ldosterone plus insulin plus prolactin was only oderately conducive. Thus, the presence of cortisol ith insulin plus prolactin plus aldosterone enhances LAL incidence of mammary cells by DMBA. The highest ncidence was found in glands treated with DMBA for 4 hr between the third and fourth day of culture, ne period corresponding to the onset of the second ave of DNA synthesis in the gland. Cytotoxicity of MBA was pronounced between 24 and 48 hr, when a igh frequency of cells were in DNA synthesis, and urvival of the cells after the cytotoxic effect of MBA appeared to play a role in NLAL incidence. This uggests that DMBA-induction of NLAL in mammary lands in organ culture involves a complex carcinogen-ormone-cell cycle interaction. Although NLAL morphoogically resembles the hyperplastic alveolar nodules f mouse mammary gland in vivo, the ability of NLAL o produce typical hyperactive alveolar outgrowth nd mammary tumor after transplantation in vivo emains to be determined.

1880 EFFECT OF DIETARY FATS ON THE INCIDENCE OF 7,12-DIMETHYLBENZ(A)ANTHRACENE-INDUCED TUMORS IN RATS. (Eng.) Hopkins, G. J. (John Curtin Sch. Medical Res., Australian Natl. Univ., P.O. Box 334, Canberra City, ACT, 2601, Australia); West, C. E.; Hard, G. C. *Lipids* 11(4): 328-333; 1976.

The incidence and type of 7,12-dimethylbenz(a)anthracene (DMBA)-induced tumors were studied in female Wistar-derived rats fed high fat (18.6%) diets containing either polyunsaturated or saturated fat. At a mean age of 32 days, the animals were transferred from normal (4.5% fat) diets to the 18.6% fat diet. The principal fatty acids in the polyunsaturated fat diet were linoleic acid (59%) and oleic acid (27%), and in the saturated fat diet, oleic acid (37%), stearic acid (19%), and palmitic acid (28%). At 60 days of age, the rats received 10 mg of DMBA ig. Animals were fed the normal diet for 2 days before and 2 days after DMBA administration. Then, the diets of half the animals were interchanged so that those previously fed the polyunsaturated fat diet were fed the saturated fat diet and vice versa. The cumulative incidence of tumor-bearing rats among DMBA-dosed rats was greater when the polyunsaturated fat diet was fed. The mean induction time of tumors decreased significantly ($p < 0.05$), and the proportion of tumor-bearing rats that developed malignant tumors increased when the polyunsaturated diet was fed. This promotional effect of the polyunsaturated fat diet was exerted only when the diet was fed after DMBA administration.

1881 HUMORAL CYTOTOXINS IN RAT BLOOD SERUM AT EARLY STAGES OF HEPATOCARCINOGENESIS. (Rus.) Kondrat'eva, A. F. (N. N. Petrov Scientific Res. Inst. Oncology, USSR Ministry Public Health, Leningrad, USSR). *Vopr Onkol* 21(12): 45-50; 1975.

Antitumor cytotoxins in rat blood serum were studied in the early stages of chemical carcinogenesis under the influence of the hepatocarcinogen dimethylaminoazobenzene (DAB). The control was the blood serum of the same rats prior to the experiment and of animals receiving the noncarcinogenic structural analog of the carcinogen, diethylaminoazobenzene (DEAB). Cytotoxins were found in the blood serum of 13 rats that received DAB and 14 rats that received DEAB in the early stages of DAB and DEAB activity, after 4, 15, 30, 60, and 100 days of feeding in daily amounts of 10 mg/rat. Under the effect of the carcinogen, there was a sharp rise in serum cytotoxic activity by the fourth day, with an increase in the percentage of dead tumor cells. On the 15th day, the carcinogen caused a decrease in serum cytotoxic activity. The activity rose again, but a drop was noted from the 60th day. The percentage of dead cells remained at the same level. After 100 days, differences in results obtained from feeding DAB and DEAB practically disappeared. The appearance of specific antitumor cytotoxic antibodies in the early stages of the action of the carcinogen may represent the response of the organism to the emergence of tumor-specific antigens, while their decrease in later stages may result from the immunodepressive state of the organism.

1882 BINDING OF 3'-METHYL-4-DIMETHYLAMINOAZOBENZENE TO NUCLEAR RIBONUCLEOPROTEIN PARTICLES. (Eng.) Yoshida, M. (Univ. Texas Medical Branch, Galveston, TX 77550); Holoubek, V. *Life Sci* 18(1): 49-54; 1976.

The binding of [^{3}H]3'-methyl-4-dimethylaminoazobenzene (^{3}H-MeDAB) to various nuclear fractions from the livers of fasted male Holtzmann rats treated with the dye (4 mg in olive oil given by stomach tube 40 hr before death) was studied. The livers were perfused in situ, fractionated, and the various fractions were subjected to protein determination and counting in a scintillation "cocktail." The specific radioactivity of the nuclear fraction soluble in Tris-HCl buffer was more than double that of the next most active fraction (soluble in 0.35 m NaCl). The carcinogenic aminoazo dyes were not released during the fractionation procedure. Analytical SDS-polyacrylamide gel electrophoresis indicated that the fraction soluble in Tris-HCl buffer and the fraction soluble in 0.35 M NaCl contained polypeptides with mobilities identical to those of the polypeptides of the ribonucleoprotein particles. The polypeptides formed a larger part of the fraction soluble in Tris-HCl buffer than of the fraction soluble in 0.35 M NaCl. Extraction of ribonucleoprotein particles also showed that the highest specific activity was present in the fraction containing these particles, and further purification of the particles by centrifugation in sucrose density gradients confirmed the higher binding of ^{3}H-MeDAB to the ribonucleoprotein particles. These findings can be of significance for understanding of the process of hepatocarcinogenesis.

1883 A POSSIBLE CHEMICAL BASIS FOR THE HIGHER MUTAGENICITY OF MARIJUANA SMOKE AS COMPARED TO TOBACCO SMOKE. (Eng.) Novotny, M. (Dept. Chemistry, Indiana Univ., Bloomington, IN 47401); Lee, M. L.; Bartle, K. D. *Experientia* 32(3): 280-282; 1976.

The results of comparative analyses of polynuclear aromatic hydrocarbon in marijuana and tobacco smoke indicate a considerably higher content of potential carcinogens in the former. A model experiment involving Δ^9-tetrahydrocannabinol suggests that the pyrolysis products of cannabinoids are major contributors to the polynuclear aromatic hydrocarbons. Although the higher mutagenicity of marijuana smoke does not necessarily mean higher carcinogenicity, the correlation between these biological phenomena and the information presented on major chemical carcinogens is highly suggestive.

1884 INCREASED LIFE SPAN AND DECREASED WEIGHT IN HAMSTERS EXPOSED TO CIGARETTE SMOKE. (Eng.) Wehner, A. P. (Biology Dept., Battelle, Pacific Northwest Labs., Richland, WA 99352); Olson, R. J.; Busch, R. H. *Arch Environ Health* 31(3): 146-153; 1976.

The cocarcinogenicity in hamsters of subcutaneously injected diethylnitrosamine (DEN), inhaled chrysotile asbestos, cobalt oxide (CoO), or nickel oxide (NiO) and of inhaled cigarette smoke was studied. Five groups of 51 2-mo-old male Syrian golden hamsters received three 10-min exposures to cigarette smoke per day, 5 days/wk, for the duration of their lives. Three of the groups were also chronically exposed to aerosols of chrysotile asbestos, CoO, and NiO, respectively. The fourth group received 12 weekly injections of 0.25 mg DEN. The smoke-exposed groups lived significantly longer than their sham-exposed cohorts and untreated controls. Their mean body weights were significantly lower than in the sham-exposed groups. It is proposed that delayed onset of amyloidosis and lower body weight in the smoke-exposed hamsters may have been responsible for their increased lifespans. Cigarette smoke probably affected the immune system of the animals, resulting in retardation of amyloidosis, a frequent cause of death in hamsters.

1885 INDUCTION OF ARYL HYDROCARBON HYDROXYLASE AND CARBON MONOXIDE-BINDING HEMOPROTEINS IN MOUSE EPIDERMIS BY TOBACCO CARCINOGENS. (Eng.) Norred, W. P. (Pharmacology Res. Lab., Richard B. Russell Agricultural Res. Center, USDA, ARS, Athens, GA 30614); Akin, F. J. *Biochem Pharmacol* 25(6): 732-734; 1976.

The difference spectra of microsomal cytochromes and aryl hydrocarbon hydroxylase (AHH) levels were measured in the mouse epidermis. The epidermal scrapings of 50- to 55-day-old ICR Swiss mice were treated with 0.2 ml of cigarette smoke condensate (CSC) fraction 20, benzanthracene, or acetone and were compared with standards containing 3-hydroxybenzo(a)pyrene and with appropriate blanks. AHH activity per milligram of protein was 10 to 15 times greater in the epidermal scrapings than in whole skin. Yields of microsomal protein were similar in control and treatment groups. Application of 5.0 moles of benzanthracene and of CSC fraction 20 increased hydroxylation of benzopyrene eight- and sevenfold, respectively. The high tumorgenicity of CSC may be related to its ability to increase the metabolism of the polycyclic hydrocarbons, which results in high concentrations of proximal carcinogens. Induction of skin AHH by application of benzanthracene or CSC fraction 20 is accompanied by an increase in carbon monoxide-binding hemoprotein.

1886 ABSENCE OF CARCINOGENIC EFFECTS OF CHRONIC FEEDING OF SNUFF IN INBRED SYRIAN HAMSTERS. (Eng.) Homburger, F. (Boston Univ. Sch. Medicine, Boston, MA); Hsueh, S.-S.; Russfield, A. B.; Laird, C. W.; VanDongen, C. G. *Toxicol Appl Pharmacol* 35(3): 515-521; 1976.

To test the carcinogenicity of snuff, two carcinogen-susceptible lines of male inbred Syrian hamsters aged 60-90 days were used. Five groups of strain BIO 15.16 and 5 groups of strain BIO 87.20 (50 hamsters/group) were each fed a different diet: (a) diet reduced in caloric content by 20% methyl-cellulose; (b) diet containing 20% snuff (powdered tobacco); (c) 50 (5-mg) gavages of 20-methylcholanthrene (MC) in addition to chow; (d) 50 (0.5-mg) gavages of MC (assumed to be a noncarcinogenic dose) with a cellulose-containing diet; (e) 50 (0.5-mg) gavages of MC with a diet containing 20% snuff. These chronic feeding studies failed to reveal any carcinogenic or cocarcinogenic effects of snuff. Presence in the serum of cotinine derived from nicotine, together with food consumption and body weight studies, showed adequate snuff intake. Tumors in the MC-fed animals demonstrated the susceptibility of the two inbred lines of Syrian hamsters used in this study. The only effect of snuff noted was a slower growth of the animals in one of the inbred lines. Thus, a diet of 20% snuff is neither carcinogenic nor cocarcinogenic for these animals.

1887 ADRENOCORTICAL FUNCTION AND SERUM PROPERDIN LEVEL OF THYMECTOMIZED AND SHAM-OPERATED RATS BEARING CHEMICALLY INDUCED TUMORS.

(Eng.) Fachet, J.; Zombory, M.; Mihaly, K.; Cseh, G. In: *Host Defense Against Cancer and Its Potentiation. Proceedings of the 5th International Symposium of The Princess Takamatsu Cancer Research Fund, Tokyo, 1975.* (Baltimore: Univ. Park Press): pp. 245-264; 1975.

Alterations of adenocortical function and serum properdin level during chemical carcinogenesis were studied in young adult thymectomized (ATx) and sham-operated (sham-op) male Wistar rats. The corticosterone level in peripheral blood and production of corticosterone by adrenals in vitro were significantly higher in sham-op than in ATx rats 120 days after 3,4-benzpyrene (BP) treatment (single sc dose of 1 ml of 0.1% BP in oil solution). The serum properdin level was significantly lower in BP-treated sham-op rats than in BP-treated ATx rats, and both were significantly lower than controls. The time of first appearance of tumors and the death of tumor-bearing rats occurred slightly later in ATx than in sham-op rats. Hypertrophy of the adrenals and spleen was found in both groups. The weight of the thymus was less in the sham-op rats than in controls. Tumor weight was less in the ATx rats than in sham-op rats. In ATx rats fed 8 mg/day yellow butter (YB, p-dimethylaminoazobenzene) for 14 mo, there was a significant increase of the corticosterone level in the peripheral blood and a decrease of it in the sham-op rats. Weights of the adrenals and liver were more conspicuously increased in ATx rats than in any other group. Contrary to expectations, ATx rats treated with BP did not show a higher incidence or accelerated development of tumors, but had a slightly lower incidence and slower appearance of tumors, and lived slightly longer than sham-op BP-treated rats.

888 THE EFFECT OF MODIFIERS OF MICROSOMAL ENZYMES ON CHEMICAL ONCOGENESIS IN CUL-URES OF C3H MOUSE CELL LINES.

(Eng.) Nesnow, S. Medical Sch., Univ. Wisconsin, Madison, WI 53706); Heidelberger, C. *Cancer Res* 36(5): 1801-1808; 1976.

Two cell lines derived from the C3H mouse, each having different (oncogenic and cytotoxic) responses to polycyclic aromatic hydrocarbon oncogens, were studied with respect to their drug-metabolizing enzymes. The 10T1/2CL8 cells (C3H mouse embryo fibroblasts) were much more effective in converting 3-methylcholanthrene (3-MC) to 3-MC water-soluble metabolites, 3-MC phenols, and 3-MC-bound cellular macromolecules than were CVP3SC6 cells (a new line of C3H mouse adult ventral prostate fibroblasts). Basal aryl hydrocarbon hydroxylase activity was higher in 10T1/2CL8 cells than in CVP3SC6 cells, while the reverse was found for epoxide hydrase activity (with 2-methylcholanthrene-11,12-oxide as substrate). 3-MC or benz(a)anthracene induced epoxide hydrase activity in both cell lines to about the same extent. 3-MC did not induce aryl hydrocarbon hydroxylase activity in CVP3SC6 cells. Aryl hydrocarbon hydroxylase activity was markedly induced in both cell lines by benz(a)anthracene and was slightly induced in 10T1/2CL8 cells by 3-MC. In a chemical oncogenesis cell culture system, transformation of 10T1/2CL8 cells mediated by 3-MC could be increased two- to threefold by treatment of the cell cultures with either benz(a)anthracene, styrene oxide, cyclohexene oxide, or 1,2,3,4-tetrahydronaphthalene-1,2-oxide; cyclohexene or 1,2-dihydronaphthalene; alkene precursors of cyclohexene oxide; and 1,2,3,4-tetrahydronaphthalene-1,2-oxide, respectively. When 10T1/2CL8 cells were treated with a combination of benz(a)anthracene and cyclohexene, 3-MC-mediated transformation was increased 7.8-fold. CVP3SC6 cells that were not transformed by 3-MC or other hydrocarbon oncogens were transformed by a combined treatment with benz(a)anthracene, 1,2-dihydronaphthalene, and 3-MC. The results indicate that a relationship exists between the steady-state levels of oncogenic epoxides and oncogenic transformation in culture.

1889 ACTION OF CARCINOGENIC AND NONCARCINOGENIC POLYCYCLIC HYDROCARBONS ON CULTURED MOUSE FIBROBLAST PHOSPHOLIPIDS.

(Fre.) Baraud, J. (Laboratoire de Biochimie des Lipides, 351, cours de la Liberation, 33405 Talence, France); Bothorel, P.; Du Pasquier, P.; Benquet, P.; Maurice, A. *C R Acad Sci (D) (Paris)* 281(22): 1785-1788; 1975.

The effects of the carcinogen benzo(a)pyrene and the noncarcinogen benzo(e)pyrene on the phospholipid content of mouse fibroblasts were determined by chromatography. Cultures of mouse (L 929) fibroblasts were treated with water-soluble serum albumin-benzopyrene; controls received the same amount of serum albumin. Benzo(a)pyrene at concentrations between 0 and 16 μg/l induced a diminution of phospholipid levels (from 16% to 8%), while concentrations between 16 and 80 μg/l increased the phospholipid levels (up to 19%); these levels then decreased linearly after concentrations greater than 80 μg. This effect was carried to the fifth generation. Only the phosphatidylchlorine level was regularly increased. The phospholipid levels were the same in the control and benzo(e)pyrene-treated fibroblasts up to 8 μg/l; all but the phosphatidylchlorine levels were altered. These changes were not carried to the next generation.

1890 INCREASED GROWTH RATE OF A BENZO(A)PYRENE-INDUCED TRANSPLANTABLE TUMOR IN BURSECTOMIZED CHICKENS. (Eng.) Linna, T. J. (Temple Univ. Sch. Medicine, Phila., PA 19140). *Cancer Res* 36(5): 1705-1709; 1976.

A benzo(a)pyrene-induced transplantable tumor was used to study the effects of bursectomy and thymectomy on tumor development in recipients WB line chickens isogenic with the donor for the major histocompatibility locus. Surgical bursectomies and thymectomies were done on the day of hatching, with no adjunct treatment. The following day, the experimental and control animals were given 10^3 live tumor cells sc. Tumor frequency and size were followed weekly. Thymectomy did not significantly affect tumor frequency or growth. Bursectomy did not affect tumor frequency, but the transplanted tumors grew significantly more rapidly in bursectomized than in control animals. Thus bursectomy, and consequently the antibody-forming system, influence not only virus-induced tumors, but also the development of a chemical carcinogen-induced transplantable tumor line.

1891 THE EFFECT OF ARISTOLOCHIC ACID ON THE DEVELOPMENT OF METHYL-CHOLANTHRENE TUMOURS IN MICE. (Eng.) Moese, J. R. (Vorstand des Hygiene-Instituts der Universitaet Graz, Universitaetsplatz 4, 8010 Graz, Austria). *Osterr Z Onkol* 2(6): 151-153; 1975.

The inhibitory effects of aristolochic acid on the growth of methylcholanthrene-induced tumors in Swiss mice were studied. Of the mice treated with 10.15 µg aristolochic acid per day po, 35% developed tumors, while 40% of those receiving this treatment plus pertussis vaccine developed tumors, 60% of those receiving pertussis vaccine only developed tumors, and 67.5% of those untreated developed tumors. It is suggested that the mechanisms of this action of aristolochic acid can be explained in terms of its capacity to stimulate the reticuloendothelial system.

1892 LONG TERM EFFECTS OF A SINGLE DOSE OF DIMETHYLNITROSAMINE ON THE RAT LIVER. (Eng.) Barbason, H. (Laboratoire d'Anatomie Pathologique, Universite de Liege, 1, rue des Bonnes Villes, B-4000-Liege, Belgium); Fridman-Manduzio, A.; Betz, E. H. *Z Krebsforsch* 84(2): 135-142; 1975.

A single injection of dimethylnitrosamine (DMNA) induced in hepatocytes different lesions that were revealed by the mitoses following a partial hepatectomy. The inhibition of mitotic activity, the appearance of micronuclei, and the development of hyperplastic nodules were investigated. The results showed that the delay between the DMNA treatment and the induction of mitotic activity influenced differently the evolution of the changes. The lesions responsible for the inhibition of mitotic activity and the production of micronuclei were produced when DMNA was given before hepatectomy. They remained unchanged for a long period and were still present 5 wk after the injection of the carcinogen; they disappeared after 10 wk. The lesions leading to the formation of hyperplastic nodules were at their greatest when DMNA was given at the time of the DNA synthesis following hepatectomy.

1893 INHIBITION OF RAT LIVER RNA POLYMERASES BY ACTION OF THE METHYLATING AGENTS DIMETHYLNITROSAMINE IN VIVO AND METHYL METHANESULFONATE IN VITRO. (Eng.) Herzog, J. (Temple Univ. Sch. Medicine, Philadelphia, PA 19149); Farber, J. L. *Cancer Res* 36(5): 1761-1770; 1976.

The effect of dimethylnitrosamine (DMN) on rat liver RNA synthesis was studied. DMN maximally inhibited synthesis by 50% at a dose of 40 mg/kg. The inhibition developed during the first 4 hr and persisted through the 12 hr. All parenchymal cells of the liver lobule seemed to be affected. The decreased RNA synthesis could be accounted for entirely by an inhibition of the RNA polymerase activities quantitatively solubilized and partially purified. A similar inhibition was demonstrated in the intact nuclei by inactivating the endogenous template with actinomycin D and assaying the polymerases with an added exogenous template, poly(deoxyadenylate deoxythymidylate). Chromatin was prepared by two methods differing in the extent to which they removed the endogenous polymerase activity. Each preparation was transcribed with either added *Escherichia coli* or partially purified rat liver nucleoplasmic RNA polymerase. With either polymerase or chromatin preparation, no inhibition of the template activity of liver nuclear chromatin isolated from the DMN-treated animals was detected. A similar mechanism of inhibition of RNA synthesis was produced by the action of the methylating agent methyl methanesulfonate on the whole nuclei in vitro. The dose-dependent inhibition of RNA synthesis could be accounted for by an inhibition of the RNA polymerase activities quantitatively solubilized and partially purified from the affected nuclei. Chromatin prepared from the methyl methanesulfonate-treated nuclei had a normal template capacity with either *E. coli* or rat liver nucleoplasmic RNA polymerase. No preferential methylation of the RNA polymerases by $[^{11}]$methyl methanesulfonate could be demonstrated. It is concluded that the action of the two methylating agents on RNA metabolism is similar and that the inhibition of liver nuclear RNA synthesis results from inactivation of the RNA polymerases.

1894 PITUITARY GROWTH HORMONE AND SOMATOTROPHS IN RATS BEARING CHEMICALLY INDUCED HEPATOMAS. (Eng.) Ingleton, P. M. (Dept. Zoology, The University, Sheffield S10 2TN, England); Hancock, M. P. *Virchows Arch [Zellpathol]* 20(3): 253-260; 1976.

Measurement of pituitary growth hormone (GH) content by polyacrylamide gel electrophoresis revealed that male Wistar and Lister Hooded rats bearing diethylnitrosamine (DENA)-induced hepatomas contained significantly less GH than age-related controls. Light microscopy revealed many apparently dying somatotrophs in tumor-bearing rats. As seen by electron microscopy, the somatotrophs of DENA hepatoma rats were relatively inactive and some were clearly dying, which could account for the reduced hormone content. However, electron microscopy of somatotrophs of rats with 2-acetylaminofluorene (2-AAF) hepatic tumor nodules revealed many very active cells with greatly increased content of free ribosomes and many granules poised for imminent release. Other somatotrophs of these rats showed lysosomal activity, indicating reduced secretion after an active phase.

1895 INHALATION CARCINOGENICITY OF ALPHA HALO ETHERS. I. THE ACUTE INHALATION TOXICITY OF CHLOROMETHYL METHYL ETHER AND BIS(CHLOROMETHYL)-ETHER. (Eng.) Drew, R. T. (Natl. Inst. Environmental Health Sciences, Research Triangle Park, NC); Laskin, S.; Kuschner, M.; Nelson, N. *Arch Environ Health* 30(2): 61-69; 1975.

A range of acute studies was made with chloromethyl methyl ether (CMME) and bis(chloromethyl)ether (BCME) that included the following: determination of 14-day LC_{50}'s for both compounds in male Sprague-Dawley rats and Golden Syrian hamsters, 30-day exposures of rats to 10 and 1 ppm CMME, and lifetime observations of both animals that survived (a) single 7-hr exposures to BCME at 10, 7, 2.1, or 0.7 ppm or (b) 30, 10, 3, or 1 exposure to 1 ppm BCME. The LC_{50}'s for CMME were 55 ppm for rats and 65 ppm for hamsters. The LC_{50}'s for BCME were 7 ppm for both species. All animals showed characteristic changes of acute irritation of the respiratory tract manifested by congestion, edema, and hemorrhage. Severe shortening of the lifespan was seen in 30-day exposures of rats to CMME and in all studies with BCME. Incidences of mucosal changes, including atypia, were generally increased in a dose-related manner in both species. The carcinogenicity of BCME was demonstrated by a skin cancer in a rat after three exposures and a nasal tumor in a hamster after one exposure to 1 ppm BCME. The changes in the tracheal and bronchial epithelium of these animals may be important in the later development of cancer. The early appearance of cell disorders usually is associated with cell death, suggesting that the damage is lethal. It is believed that the more subtle changes, invisible to the light microscope, are the origins of neoplastic transformation.

1896 INHALATION CARCINOGENICITY OF ALPHA HALO ETHERS. III. LIFETIME AND LIMITED PERIOD INHALATION STUDIES WITH BIS(CHLOROMETHYL)ETHER AT 0.1 PPM. (Eng.) Kuschner, M. (State Univ. New York, Stony Brook, NY); Laskin, S.; Drew, R. T.; Cappiello, V.; Nelson, N. *Arch Environ Health* 30(2): 73-77; 1975.

Male Sprague-Dawley rats and male Golden Syrian hamsters were exposed to 0.1 ppm bis(chloromethyl)-ether (BCME) 6 hr/day, 5 days/wk throughout their lifetime. Additional groups of rats were given 10, 20, 40, 60, 80, and 100 exposures to 0.1 ppm BCME and then held until death. Forty cancers originating in the respiratory tract were found in the 200 rats involved. These included 14 cancers of the lung and 26 cancers of the nasal cavity. They occurred in dose-related fashion. A single undifferentiated carcinoma of the lung was seen in a hamster. The low levels of BCME used here prove the compound to be a potent carcinogen. This has been reinforced by human epidemiological studies that have identified atypical cells in the sputum of exposed workers that have been linked to the carcinogen.

1897 VINYL CHLORIDE DEPENDENT MUTAGENESIS: EFFECTS OF LIVER EXTRACTS AND FREE RADICALS. (Eng.) Garro, A. J. (Mount Sinai Sch. Medicine City Univ. New York, New York, NY 10029); Guttenplan, J. B.; Milvy, P. *Mutat Res* 38(2): 81-88; 1976.

The mutagenic effects of vinyl chloride (VC) on *Salmonella typhimurium* strain TA1530 were enhanced by male Swiss-Webster mice or Sprague-Dawley rat liver extracts. The extracts prepared from mice pretreated either with vinyl chloride or the microsomal enzyme inducer, Aroclor 1254, did not produce any greater stimulation of VC-dependent mutagenesis than extracts from untreated animals. These same extracts, however, differed markedly in their capacity to stimulate the mutagenicity of dimethylnitrosamine (DMN). The order of activity of the extracts with DMN was Aroclor pretreated > untreated > VC pretreated. The stimulatory effect of the liver extracts on VC mediated mutagenesis did not require NADPH. The stimulatory effect of liver extracts on the mutagenic activity of VC in the *Salmonella* auxotroph reversion test cannot be ascribed to enzymatic activation by a microsomal mixed function oxidase. The mutagenic activity was also found to be stimulated by riboflavin in the presence of light suggesting that free radicals may be involved in VC dependent mutagenesis.

1898 HISTOPATHOLOGY OF LIVER LESIONS ASSOCIATED WITH EXPOSURE TO VINYL CHLORIDE MONOMER. (Eng.) Weinbren, K. (Royal Postgraduate Medical Sch., Du Cane Road, London W12 0HS, England). *Proc R Soc Med* 69(4): 299-303; 1976.

An outline of the cell characteristics of angiosarcoma of the liver and changes that have occurred, with and without tumor development, in patients exposed to vinyl chloride monomer are presented. The tumors appear as dark hemorrhagic nodules with distortion and fibrosis in the intervening tissue; frank necrosis is often present. There are three types of involvement: the sinusoidal pattern, the papillary type, and the cavernous type. The cells are usually associated with vessel walls and vascular spaces. Near the tumor and sometimes in the absence of tumors, perisinusoidal reticular fibers are prominent and fibrosis in the portal tracts is often reported. Subcapsular fibrosis may also occur. The relevance of these nontumorous changes to the subsequent development of angiosarcoma is unknown at this time.

1899 TEST FOR CARCINOGENICITY OF METALLIC COMPOUNDS BY THE PULMONARY TUMOR RESPONSE IN STRAIN A MICE.

(Eng.) Stoner, G. D. (Univ. California, San Diego, La Jolla, CA 92093); Shimkin, M. B.; Troxell, M. C.; Thompson, T. L.; Terry, L. S. *Cancer Res* 36(5): 1744-1747; 1976.

The production of lung adenomas in strain A/Strong mice following multiple ip injections of 13 metallic compounds was investigated. When possible the mice were given thrice-weekly injections, for a total of 24 injections. A significant increase in the average number of lung tumors per mouse was noted following the administration of lead subacetate, manganous sulfate, molybdenum trioxide, and nickelous acetate. These four compounds can be considered weakly carcinogenic for lung tumors in stain A mice.

1900 EFFECTS OF MANGANESE ON CARCINOGENICITY AND METABOLISM OF NICKEL SUBSULFIDE.

(Eng.) Sunderman, F. W., Jr. (Univ. Connecticut Health Center, Farmington, CT 06032); Kasprzak, K. S.; Lau, T. J.; Minghetti, P. P.; Maenza, R. M.; Becker, N.; Onkelinx, C.; Goldblatt, P. J. *Cancer Res* 36(5): 1790-1800; 1976.

Nickel subsulfide, Ni_3S_2, alone or combined with manganese or chromium dusts, was administered im to Fischer rats to study the effects of the metals upon Ni_3S_2 induction of sarcomas at the injection site. The incidence of sarcomas within 2 yr after injection of Ni_3S_2 (1.2 mg) plus manganese (1.0 mg) was 7%, vs 77% in rats that received only Ni_3S_2 (1.2 mg), and 80% in rats that received Ni_3S_2 (1.2 mg) plus chromium (1.0 mg). No local sarcomas occurred in rats that received the injection vehicle, or in rats that received manganese or chromium without Ni_3S_2. Admixture of manganese diminished the solubility of $^{63}Ni_3S_2$ in rat serum, serum ultrafiltrate, or water, in vitro. Admixture of manganese with $^{63}Ni_3S_2$ did not affect the mobilization or excretion of ^{63}Ni in vivo, nor did it alter the acute pathological reactions to Ni_3S_2. ^{63}Ni concentrations in ultrafiltrates of supernatant fractions of homogenates of injection sites averaged 2.8 ng/ml at 5-6 mo after injection of $^{63}Ni_3S_2$ (1.2 mg) plus manganese (1.0 mg), vs 5.4 ng/ml after injection of only $^{63}Ni_3S_2$ (1.2 mg). This study demonstrates that admixture of manganese dust and Ni_3S_2 inhibits Ni_3S_2 tumorigenesis in rats, and reveals that manganese dust affects the subcellular distribution of ^{63}Ni derived from $^{63}Ni_3S_2$ without influencing ^{63}Ni kinetics (as estimated by compartmental analysis).

1901 TUMORIGENIC ACTIVITY OF LEAD CHROMATE.

(Eng.) Furst, A. (Inst. Chemical Biology, Univ. San Francisco, San Francisco, CA 94117); Schlauder, M.; Sasmore, D. P. *Cancer Res* 36(5): 1779-1783; 1976.

Lead chromate was investigated for its carcinogenic potential in Fischer 344 rats and female NIH-Swiss mice. Results show that this compound is a very potent carcinogen in rats when administered im. Sixty-four percent of the animals treated developed malignant tumors at the injection site. Three renal carcinomas were also found after im treatment with lead chromate. Since lead powder is a comparatively weak carcinogen in rats, whether given po or im, it is suggested that the combination of lead and chromium (also a weak carcinogen) accounts for the high carcinogenic activity of lead chromate in rats. Swiss albino female mice could not tolerate the same high dose level as did the rats; at the lower dose administered to the mice, no tumors were detected.

1902 THE INFLUENCE OF DL-METHIONINE ON THE METABOLISM OF S-ADENOSYLETHIONINE IN RATS CHRONICALLY TREATED WITH DL-ETHIONINE.

(Eng.) Brada, Z. (Papanicolaou Cancer Res. Inst. at Miami, Miami, FL 33136); Bulba, S.; Altman, N. H. *Cancer Res* 36(5): 1573-1579; 1976.

The effect of methionine on the metabolism of S-adenosylethionine in the livers of female CFN rats chronically intoxicated with the carcinogen ethionine was studied. The concentration in the liver of S-adenosylethionine increased gradually during carcinogenesis, possibly due to the decreased capacity of the treated rats to acetylate ethionine sulfoxide. When the ethionine diet was supplemented by DL-methionine (0.3 to 0.9%), the increase in the concentration of S-adenosylethionine during the observation period (28 to 150 days) was lower and the acetylation of ethionine sulfoxide was significantly higher. The concentration of the total S-adenosyl compounds in the liver of rats on a diet supplemented with DL-methionine was increased over the concentration of S-adenosylethionine in rats fed ethionine alone, and the S-adenosylethionine portion of this fraction was only about 30% lower. Supplementation of the diet with methionine restored the diurnal oscillation of ATP in the liver, which had been absent in rats ingesting only ethionine.

1903 THE METABOLIC ACTIVATION OF THE CARCINOGEN 1'-HYDROXYSAFROLE IN VIVO AND IN VITRO AND THE ELECTROPHILIC REACTIVITIES OF POSSIBLE ULTIMATE CARCINOGENS.

(Eng.) Wislocki, P. G. (Univ. Wisconsin Medical Center, Madison, WI 53706); Borchert, P.; Miller, J. A.; Miller, E. C. *Cancer Res* 36(5): 1686-1695; 1976.

The metabolic activation of 1'-hydroxysafrole was studied in vivo and in vitro, and the electrophilic reactivities of various potential carcinogenic metabolites were determined. Administration ip of [2',3'-^{3}H]-1'-hydroxysafrole to CD rats or CD-1 mice resulted in the formation of hepatic DNA-, ribosomal RNA-, and protein-bound ^{3}H derivatives. Alkaline digestion of the ^{3}H-protein released 0.1 to 0.3% of the ^{3}H as a derivative identified as 3'-methylmercaptoisosafrole by its cochromatography in five solvent systems with the synthetic compound. 1'-Hydroxysafrole was metabolized at a low rate by rat and mouse liver cytosols in a 3'-phosphoadenosine 5'-phosphosulfate-dependent reaction to a derivative (presumably the sulfuric acid ester) that was captured by its reaction with RNA. Likewise, 1'-hydroxysafrole was oxidized at a low rate by rat and mouse liver microsomes to 1'-hydroxysafrole-2',3'-oxide in a reduced nicotinamide adenine dinucleotide phosphate-dependent reaction. Both of these electrophilic metabolites are candidate ultimate carcinogenic derivatives of 1'-hydroxysafrole. The electrophilic reactivities of various safrole derivatives with nucleosides were determined to be, in descending order, 1'-oxosafrole; 1'-acetoxysafrole; 1'-acetoxysafrole-2',3'-oxide; 1-hydroxysafrole-2',3'-oxide; safrole-2',3'-oxide; 1'-oxosafrole-2',3'-oxide. The major reactions were generally observed with guanosine. A major reaction product of 1'-acetoxysafrole and guanosine 5'-monophosphate yielded 3'-hydroxyisosafrole under very mild acidic conditions. These data further substantiate the previous characterization of this reaction product as O-6-(isosafrol-3'-yl)guanylic acid.

1904 EFFECTS OF PREDNISOLONE ON THE DIFFERENTIATION OF MOUSE LUNG ADENOMAS IN CULTURE.

(Eng.) Adamson, I. Y. R. (Dept. Pathology, Univ. Manitoba, Winnipeg, Manitoba, Canada); Klass, D. J. *Cancer Res* 36(5): 1669-1673; 1976.

The effect of prednisolone on urethan-induced adenomas was tested in an organ culture system. Explants of pulmonary adenomas, induced in female Swiss Webster mice by urethan, were cultured with or without prednisolone for 72 hr. After this time, the cuboidal epithelial cells of the tumor contained many more lamellar bodies than the nonsteroid control cultures. Incorporation of ^{14}C-labeled palmitic acid into saturated phosphatidylcholine was not significantly increased in these short-term steroid-treated cultures. The results indicate that steroid enhances the maturation of cultured pulmonary adenoma cells into cells morphologically indistinguishable from type II alveolar epithelial cells of normal lung.

1905 SYNTHESIS OF N-NITROSAMINO ALDEHYDES.

(Eng.) Hecht, S. S. (American Health Foundation, Valhalla, NY 10595); Chen, C. B.; Hoffmann, D. *Tetrahedron Lett* (8): 593-596; 1976.

The synthesis of the N-nitrosamino aldehydes 4-(N-butyl-N-nitrosamino)butanal, 4-(N-benzyl-N-nitrosamino)butanal, and 4-(N-methyl-N-nitrosamino)-4-(3-pyridyl)butanal, possible metabolic intermediates in the activation of carcinogenic nitrosamines or possible environmental carcinogens is reported. The syntheses were begun with the corresponding amino alcohols. The amino alcohols were nitrosated with $NaNO_2$ to give nitrosamino alcohols that were oxidized to the nitrosamino aldehydes with dimethylsulfoxide and dicyclohexylcarbodiimide. The spectral properties of the four new aldehydes were determined; in each case, the new compound was a mixture of Z- and E-isomers. The nitrosamino aldehydes are relatively stable compounds that do not develop detectable impurities when stored in CH_2Cl_2, under N_2, and at 0 C for 2 mo or more. Storage of these compounds in the open without solvent led to the slow appearance of secondary products, presumably due to oxidation.

1906 TRANSFORMATION OF NITRATES IN RAT ALIMENTARY CANALS.

(Fre.) Fritsch, P. (Groupe de Recherches sur la Toxicologie des Aliments et des Boissons, INSERM U. 87, 2, rue Francois-Magendie, 31400 Toulouse, France); De Saint-Blanquat, G.; Derache, R. *Eur J Toxicol Environ Hyg* 8(6): 341-345; 1975.

The reduction of nitrates into nitrites in different areas of the alimentary tract was studied in male Sprague-Dawley rats. The stomach, the small intestine, the gastric and intestinal mucosa, and the cecum were all placed in glucose solutions and treated with 500 mg KNO_3. After 96 hr, practically no nitrate modification had occurred in the stomach. The gastric and intestinal mucosa reduced the nitrates by 20% and 50%, respectively. The small intestine and the cecum transformed nearly 50% of the nitrates. KNO_3 was not reactive at 37 C to pH variations between 1 and 8. Reducing agents other than the gastric juices, such as ascorbic acid, citric acid, and stannous chloride, did not reduce KNO_3 either. The cellular activity of the small intestine was more important than the activity of the cecal flora in nitrate reduction.

1907 AN ASSESSMENT OF THE EFFECT OF IMPROVED WORKING CONDITIONS ON BLADDER TUMOR INCIDENCE IN A BENZIDINE MANUFACTURING FACILITY.

(Eng.) Ferber, K. H. (Allied Chemical Corporation, Buffalo, NY 14210); Hill, W. J.; Cobb, D. A. *Am Ind Hygiene Assoc J* 37(1): 61-68; 1976.

The effect of improved working conditions on the incidence of bladder tumors among workers at Allied Chemical's Buffalo, N.Y. dye manufacturing facility was assessed. Upon discovering that both the base and the benzidine sulfate used in the manufacturing process were carcinogenic, a new fully enclosed wet process for benzidine sulfate was installed and successfully demonstrated in 1955. The important ways in which the new process and its controls differ from the previous process are listed. In addition, a number of industrial hygiene controls are now in effect in the facility which were not fully in effect prior to 1955; these procedures and rules are also listed. A statistical analysis of the data on persons exposed to benzidine before and after the advent of the new processing and safety measures showed a highly significant reduction in the number of bladder tumor cases. Also, an extension of the analysis to employees from all areas of the plant showed that there have been no reported bladder tumors in persons entering the plant since 1955. This absence of tumors in the more recent employees cannot be entirely assigned to a reduction in the incidence rate because the person-years of followup for the periods in question are not precisely known. However, the correlation over time between reduced bladder tumors and improved working conditions is obvious and the improved conditions must be considered an important factor in the favorable trend.

1908 CHANGES IN NUCLEAR NON-HISTONE PROTEIN COMPOSITION DURING NORMAL DIFFERENTIATION

AND CARCINOGENESIS OF INTESTINAL EPITHELIAL CELLS. (Eng.) Boffa, L. C. (Rockefeller Univ., New York, NY 10021); Vidali, G.; Allfrey, V. G. *Exp Cell Res* 98(2): 396-410; 1976.

Nuclei from colonic epithelial cells were isolated and fractionated by centrifugation in discontinuous sucrose density gradients. Nuclei with differing buoyant densities vary in size, non-histone protein/DNA ratio, and capacity for DNA synthesis in vivo. They do not differ in histone content or in proportions of the major histone classes. The distribution of cell nuclei after density gradient centrifugation corresponds functionally to their histological localization in the colonic mucosa, as judged by the nuclear capacity for DNA synthesis in both normal and tumor tissues. These nuclei contain a heterogeneous set of non-histone proteins which change in total amount and in relative proportions during normal differentiation. The complement of nuclear proteins differed in normal intestinal epithelial clls and in colon tumors induced by 1,2-dimethylhydrazine. The nuclear content of two major protein classes (of molecular wt 44,000 and 62,000) increased during carcinogenesis. The accumulation of these proteins in the nuclei of carcinogen-treated cells followed early, selective increases in their rates of synthesis. Major differences occur in the amounts and relative proportions of nuclear non-histone proteins at different stages in differentiation. The synthesis of these nuclear proteins is enhanced at very early times in carcinogenesis, long before any morphological changes may be detected.

1909 ESTROGENS AND ENDOMETRIAL CARCINOMA (Letter to Editor). (Eng.) Nachtigall, L. E. (New York Univ. Sch. Medicine, New York, NY); Nachtigall, R. H.; Nachtigall, R. B.; Beckman, E. M. *N Engl J Med* 294(15): 848; 1976.

An advance report is presented of a 10-yr study of estrogen replacement therapy. A group of 84 patients, matched with placebo controls (total study group 168), were selected for estrogen replacement and were given medroxyprogesterone acetate po, 10 mg/day, 7 days/mo for 10 yr. The majority of the patients on estrogen had desquamination of the endometrium every menstrual period. These patients, on estrogen and progesterone for 10 yr, did not develop endometrial carcinoma; however, two of the controls did.

1910 ASSOCIATION OF ESTRONE WITH THE DEVELOPMENT OF ENDOMETRIAL CARCINOMA. (Eng.) Ziel, H. K. (Kaiser Permanente Medical Center, 4900 Sunset Blvd., Los Angeles, CA 90027); Finkle, W. D. *Am J Obstet Gynecol* 124(7): 735-740; 1976.

A study of 94 postmenopausal women indicated that 70% of those with endometrial carcinoma and only 23% of matched control subjects used estrogen systemically. Endometrial cancer developed an average of 5 yr earlier in those taking than in those not receiving estrogen. Forty-two percent of those with endometrial cancer had received estrogen 3 yr or more. Most significantly, conjugated estrogens were used by 89% of postmenopausal cancer patients who had received any estrogenic substance. The increased risk of endometrial cancer for all patients receiving conjugated estrogen (the risk ratio) was 7.4. This risk ratio increased with duration of conjugated estrogen exposure, from 4.6 in patients with less than 3 yr of exposure to 9.2 in patients with 3 yr of exposure or more. It is suggested that the conversion of estrone to estradiol by the endometrium may account for the carcinogenicity of estrone and, therefore, of the conjugated estrogens.

1911 EXOGENOUS ESTROGENS AND BREAST CANCER IN WOMEN WITH NATURAL MENOPAUSE. (Eng.) Casagrande, J. (Cancer Res. Project, Edmondson Res. Building, 1840 North Soto St., Los Angeles, CA 90033); Gerkins, V.; Henderson, B. E.; Mack, T.; Pike, M. C. *J Natl Cancer Inst* 56(4): 839-841; 1976.

Data from two groups of breast cancer patients and matched controls were compared to determine the effect of exogenous estrogens taken after menopause on breast cancer risk. An unadjusted analysis showed the relative risks of the women in the two groups to be 0.47 and 2.15, respectively. When this was accounted for the apparent protective effect of estrogens in the first group was reduced from 0.47 to 0.75. When those with a difference of less than 2 yr between menopause and diagnosis were excluded, the apparent protective effect disappeared. Adjustments of the data from the two groups gave a risk ratio of 1.2. The results negate previous findings that postmenopausal exogenous estrogens exert a protective effect against breast cancer and show that this apparent effect can be explained by a relationship between the timing of menopause and diagnosis.

1912 OESTRIOL IN HUMAN BREAST TUMOURS. (Eng.) Deshpande, N. (Imperial Cancer Res. Fund, Lincoln's Inn Fields, London, WC2A 3PX, England); Carson, P.; Horner, J. *J Steroid Biochem* 7(1): 11-13; 1976.

The uptake of estriol by human breast tumors and the effect of pretreatment with estriol on estradiol accumulation were studied. Labeled compounds were injected into the patients at least 1 hr before mastectomy, and a sample of peripheral blood was taken during the operation. In one experiment, 2.5 hr after injection of ^{3}H-estradiol, the tumor contained six times as many counts as the peripheral blood. With ^{3}H-estriol, the tumor-blood ratio was 5.7 at about 2 hr. When four doses of 0.5 mg estriol were given po before surgery and ^{3}H-estradiol was then injected, the estriol had no effect on the amount of radioactive estradiol in the blood at 2 hr. The free estradiol in the tumor was also unaffected by the pretreatment. In two patients given the same estriol pretreatment, but spread over 3 days rather than 20 hr, there was no diminution of plasma or tumor estradiol levels.

913 INHIBITION OF THE CONVERSION OF CHOLESTEROL TO PREGNENOLONE IN BOVINE ADRENOORTICAL PREPARATIONS. (Eng.) Burstein, S. (Mount inai Sch. Medicine, New York, NY 10029); etourneux, Y.; Kimball, H. L.; Gut, M. *Steroids* 7(3): 361-382; 1976.

he inhibition of the conversion of [4-^{14}-C] holesterol to [4-^{14}C]pregnenolone by a number of teroids was studied in bovine adrenocortical itochondrial acetone-dried preparations. At equiolar substrate and inhibitor concentrations (3.3 M), the most potent inhibitors were cholesterol erivatives containing a nitrogen function at C-22, ollowed by derivatives containing oxygen funcions at C-22 or C20 or both. The presence of a ydroxyl group at C-17 or replacement of the 3β-ydroxyl group by fluorine reduced inhibition. In he presence of inhibitors that were also relaively good substrates of the cholesterol side-hain cleavage system, such as some cholesterol erivatives hydroxylated in the side chain, [4-^{14}C] regnenolone formation increased with time as the nhibitor was consumed. (20S)-20,21-Dihydroxyholesterol exerted such an effect on the kinetics f [4-^{14}C]pregnenolone formation and yielded 21-ydroxypregnenolone, which was identified by gas hromatography-mass spectrometry. (20R)-22-Ketoholesterol, (20R,22R)-22-hydroxycholesterol, (20R, 2S)-hydroxycholesterol, and (20S)-desmosterol ere synthesized.

914 ALTERATIONS OF DNA-DEPENDENT DNA POLYMERASE ACTIVITIES IN THE IMMATURE QUAIL VIDUCT IN RESPONSE TO ESTROGEN STIMULATION. Eng.) Rohde, H. J. (Physiologisch-Chemisches nstitut der Johannes Gutenberg-Universitaet, 65 ainz, Johann Joachim Becher 13, W. Germany); Mueler, W. E. G.; Zahn, R. K. *Nucleic Acids Res* 2(11): 101-2109; 1975.

dministration of diethylstilbestrol to immature emale quails increased extractable DNA-dependent NA polymerase activities in the oviduct. At least wo forms of polymerases were determined, a high olecular weight polymerase, (210,000 daltons) and low molecular weight polymerase (34,000 daltons) alculated from column chromatography using Sephaex G-200. During primary hormone stimulation, the mount of extractable enzyme reached a maximum on he fifth day after daily injections of the horone. In the withdrawal period the activities ecreased, and reached values similar to those etermined in the unstimulated oviducts. During econdary stimulation the polymerase activities ncreased again on the first day; subsequently, he values decreased drastically. Alterations in nzyme activity correlated with DNA synthesis in he oviduct, according to an analytical determinaion of the DNA content.

915 TUMOR INDUCTION IN *NICOTIANA SUAVEOLENS* X *N. LANGSDORFFII* SEEDLINGS BY OXYGENATED OLUTIONS OF PYROGALLOL (Proceedings Abstract). Eng.) Andersen, R. A. (Agricultural Science Center North, Univ. Kentucky, Lexington, KY 40506); Leonard, H.; Linney, L. *Proc Am Assoc Cancer Res* 17: 146; 1976.

1916 CARCINOGENIC ACTIVITY OF MILK FROM BRACKEN FERN FED COWS (Proceedings Abstract). (Eng.) Pamukcu, A. M. (Dept. Human Oncology, Univ. Wisconsin Center for Health Sciences, Madison, WI 53706); Erturk, E.; Yalciner, S.; Milli, U.; Bryan, G. T. *Proc Am Assoc Cancer Res* 17: 14; 1976.

1917 CHROMOSOMAL DAMAGE AS A SCREEN FOR CARCINOGENIC/MUTAGENIC POTENTIAL OF ANTICANCER DRUGS (Proceedings Abstract). (Eng.) Banerjee, A. (Childrens Hosp. Los Angeles, Los Angeles, CA 90027); Benedict, W. F. *Proc Am Assoc Cancer Res* 17: 91; 1976.

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1998 BINDING OF POLYCYCLIC HYDROCARBONS TO NUCLEAR PROTEINS AND NUCLEIC ACIDS (Proceedings Abstract). (Eng.) Vaught, J. B. (Medical Coll. Georgia, Augusta, GA 30902). *Proc Am Assoc Cancer Res* 17: 54; 1976.

1999 ENHANCED CELLULAR BINDING AND PENETRATION OF NUCLEIC ACIDS CAUSED BY CHEMICAL AND PHYSICAL CARCINOGENS AND MUTAGENS (Proceedings Abstract). (Eng.) Kubinski, H. (Univ. Wisconsin, Madison, WI 53706); Morin, N. M.; Zeldin, P. E. *Proc Am Assoc Cancer Res* 17: 8; 1976.

2000 DAMAGE AND REPAIR OF DNA IN VITRO WITH A GROUP OF STABLE DIAZOALKANES (Proceedings Abstract). (Eng.) Parodi, S. (Dept. Oncology, Faculty Medicine, Univ. Genoa, Italy); Bolognesi, C.; Esposito, M.; Brambilla, G. *Proc Am Assoc Cancer Res* 17: 104; 1976.

2001 EFFECTS OF LIGHT ON 7,12-DIMETHYLBENZ(A)ANTHRACENE-DNA PRODUCTS (Proceedings Abstract). (Eng.) Baird, W. M. (Wistar Inst., Philadelphia, PA 19104); Diamond, L. *Proc Am Assoc Cancer Res* 17: 138; 1976.

2002 SPECIFICITY OF INTERACTION OF DIRECTLY ACTING CARCINOGENS WITH DNA (Proceedings Abstract). (Eng.) Ramanathan, R. (NCI Frederick Cancer Res. Center, Frederick, MD 21701); Dipple, A. *Proc Am Assoc Cancer Res* 17: 77; 1976.

2003 EFFECT OF 7,12-DIMETHYLBENZ(A)ANTHRACENE BINDING TO RAT MAMMARY EPITHELIAL CELL DNA IN VITRO AND ITS EFFECT ON DNA SYNTHESIS (Proceedings Abstract). (Eng.) Janss, D. H. (NCI Frederick Cancer Res. Center, Frederick, MD 21701); Malan, L. B.; Kelley, S. P. *Proc Am Assoc Cancer Res* 17: 145; 1976.

2004 GENETIC DIFFERENCES IN CARCINOGENIC INDEX OF BENZO[A]PYRENE IN VIVO AND BINDING OF ITS METABOLITES TO DNA IN VITRO (Proceedings Abstract). (Eng.) Boobis, A. R. (NICHD, NIH, Bethesda, MD 20014); Nebert, D. W. *Proc Am Assoc Cancer Res* 17: 48; 1976.

2005 INTERINDIVIDUAL VARIATION IN BENZO[A]PYRENE (BP) BINDING TO DNA IN CULTURED HUMAN BRONCHI (Proceedings Abstract). (Eng.) Harris, C. (Human Tissue Studies Section, Experimental Pathology Branch, Carcinogenesis, NCI, Bethesda, MD 20014); Autrup, H.; van Haaften, C. *Proc Am Assoc Cancer Res* 17: 31; 1976.

2006 DISULFIRAM INHIBITION OF BENZO(A)PYRENE (BP) MACROMOLECULAR BINDING AND OF BP-INDUCED NEOPLASIA OF THE MOUSE FORESTOMACH (Proceedings Abstract). (Eng.) Borchert, P. (Dept. Lab. Medicine and Pathology, Univ. Minnesota, Minneapolis, MN 55455); Watternberg, L. W. *Proc Am Assoc Cancer Res* 17: 75; 1976.

2007 BINDING OF ^{3}H-BENZO(A)PYRENE (BP) METABOLITES TO NUCLEAR CONSTITUENTS OF RAT LUNG AND LIVER (Proceedings Abstract). (Eng.) Pezzuto, J. M. (New Jersey Medical Sch., Newark, NJ 07103); Lea, M. A.; Yang, C. S. *Proc Am Assoc Cancer Res* 17: 97; 1976.

2008 PREMALIGNANT LIVER CELLS IN CULTURE ARE RESISTANT TO DEXAMETHASONE-ENHANCED EPITHELIAL-LIKE MORPHOLOGY (Proceedings Abstract). (Eng.) Laishes, B. A. (Univ. Toronto, Toronto, Ontario, Canada M5S 1A8). *Proc Am Assoc Cancer Res* 17: 36; 1976.

2009 ENHANCED SUSCEPTIBILITY OF CULTURED RAT LIVER EPITHELIAL CELLS TO MUTAGENESIS DURING DNA SYNTHESIS (Proceedings Abstract). (Eng.) Berman, J. J. (Naylor Dana Inst. for Disease Prevention, Valhalla, NY 10595); Williams, G. M. *Proc Am Assoc Cancer Res* 17: 158; 1976.

2010 CARCINOGENICITY, STRUCTURE AND CHEMICAL REACTIVITY OF ALIPHATIC HALO COMPOUNDS (Proceedings Abstract). (Eng.) Goldschmidt, B. M. (New York Univ. Medical Center, New York, NY 10016); Van Duuren, B. L.; Goldstein, R. C. *Proc Am Assoc Cancer Res* 17: 79; 1976.

2011 TRANSFORMATION OF A SUBCLONE OF BHK21 CLONE 13 BY ULTRAVIOLET LIGHT AND CHEMICAL CARCINOGENS (Proceedings Abstract). (Eng.) Ishii, Y. (Natl. Inst. Environmental Health Sciences, Research Triangle Park, NC 27709); Lieberman, M. W. *Proc Am Assoc Cancer Res* 17: 76; 1976.

2012 DEVELOPMENT OF A QUANTITATIVE FOCUS ASSAY FOR TRANSFORMATION OF HAMSTER CELLS BY CHEMICAL CARCINOGENS (Proceedings Abstract). (Eng.) Evans, C. H. (NCI, Bethesda, MD 20014); Janosko, N.; Casto, B. C.; DiPaolo, J. A. *Proc Am Assoc Cancer Res* 17: 193; 1976.

2013 TRANSFORMATION ASSAY OF SELECTED NITROSATED COMPOUNDS BY THE HAMSTER TRANSPLACENTAL CELL TECHNIQUE (Proceedings Abstract). (Eng.) Quarles, J. M. (Biology Div., Oak Ridge Natl. Lab., Oak Ridge, TN 37830); Sega, M. W.; Schenley, C. K.; Tennant, R. W. *Proc Am Assoc Cancer Res* 17: 72; 1976.

2014 HEPATIC MICROSOMAL GLUCURONIDATION OF N-HYDROXY ARYLAMINES (Proceedings Abstract). (Eng.) Kadlubar, F. F. (McArdle Lab., Univ. Wisconsin, Madison, WI 53706); Miller, J. A.; Miller, E. C. *Proc Am Assoc Cancer Res* 17: 38; 1976.

2015 STUDIES ON THE SURFACE PROTEINS FROM CHEMICALLY TRANSFORMED CELLS (Proceedings Abstract). (Eng.) Clarke, S. (Univ. Colorado Medical Center, Denver, CO 80220); Fink, L. M. *Proc Am Assoc Cancer Res* 17: 62; 1976.

See also:

* (Rev): 1801, 1802, 1803, 1804, 1805, 1806, 1807, 1808, 1809, 1810, 1827, 1841, 1842, 1843, 1844, 1845, 1846, 1860
* (Phys): 2026
* (Viral): 2084
* (Immun): 2181
* (Path): 2216, 2218, 2245, 2246, 2248, 2260, 2273, 2275, 2287, 2306, 2309
* (Epid-Biom): 2310, 2311, 2312, 2318, 2319, 2324

2016 MALIGNANT TUMORS OF THE HEAD AND NECK IN PREVIOUSLY IRRADIATED PATIENTS. (Eng.) Schindel, J. (Beilinson Medical Center, Tel Aviv Univ. Medical Sch., Petah Tikva, Israel); Levy, R. *Minerva Otorinolaringol* 25(2): 179-185; 1975.

A series of 25 cases of malignancy in regions of the head and neck that had previously been subjected to irradiation is described. Of these, nine presented with carcinoma of the thyroid, eight with carcinoma of the lower pharynx and/or upper esophagus, four with carcinoma of the salivary glands, and four with carcinoma of the face and mouth. Attention is drawn to the growth-inhibiting effect of radiation in addition to the development of malignancy in irradiated areas.

2017 IMMUNOLOGICAL PHENOMENA INDUCED BY UV RAYS. (Eng.) Jarzabek-Chorzelska, M. (Warsaw Medical Sch., Koszykowa 82 a, Warsaw, Poland); Zarebska, Z.; Wolska, H.; Rzesa, G. *Acta Derm Venerol (Stockh)* 56(1): 15-18; 1976.

Antiserum against UV-irradiated DNA was prepared and used as a specific reagent in an indirect immunofluorescence (IF) technique to detect photochemically damaged DNA in the epidermis of hairless mice. Fluorescence of cell nuclei was found in sections of the dorsal epidermis of mice immediately after the irradiation. It persisted for 24 hr. The IF reaction became negative after 48 hr, irrespective of the duration of UV exposure to which the mice were subjected. This may indicate either (a) the occurrence of DNA repair processes or (b) the relation of DNA repair to the life cycle of the epidermal cell. Mice exposed to UV radiation similar to the erythema spectrum of sunlight do not show any changes in the cellular DNA, even after a dose of 40 MED's (minimal erythema dose).

2018 DEFECTIVE REPAIR OF GAMMA-RAY-INDUCED DNA DAMAGE IN XERODERMA PIGMENTOSUM CELLS. (Eng.) Setlow, R. B. (Biology Dept., Brookhaven Natl. Lab., Upton, NY 11973); Faulcon, F. M.; Regan, J. D. *Int J Radiat Biol* 29(2): 125-136; 1976.

The bromouracil (BrUra)-photolysis technique was used to estimate the sizes of the repaired regions in normal human and xeroderma pigmentosum (XP) cells irradiated by γ-rays aerobically or anoxically. After 1.5 hr of incubation, single-strand breaks were repaired and the repaired regions were small—one to two BrUra residues—for cells irradiated aerobically or anoxically. After a 20-hr incubation, the repaired region in normal cells showed a component mimicking UV repair. There were large patches in the approximate ratios of one per six chain breaks for aerobic irradiation and one per three chain breaks for anoxic irradiation. XP cells, however, only showed large patches at 20 hr if they had been irradiated aerobically. Such regions in anoxically irradiated XP cells were not detected. Three conclusions were drawn: (1) Some part of ionizing damage apparently mimics excision of UV damage in that the repair patches are large and the repair takes an appreciable time. (2) The types of such damage depend on whether the irradiation is done aerobically or anoxically. (3) XP cells are defective in repairing a component of anoxic damage. It is hypothesized that DNA-damaging agents may induce several types of damages which may be repaired according to the structural configurations of the damage that they induce and the suites of enzymes present for dealing with these damages.

2019 DEFECTIVE EXCISION REPAIR OF γ-RAY-DAMAGED DNA IN HUMAN (ATAXIA TELANGIECTASIA) FIBROBLASTS. (Eng.) Paterson, M. C. (Biology and Health Physics Div., Chalk River Nuclear Labs., Atomic Energy of Canada Ltd., Chalk River, Ontario K0J 1J0, Canada); Smith, B. P.; Lohman, P. H. M.; Anderson, A. K.; Fishman, L. *Nature* 260(5550): 444-447; 1976.

A study of the DNA repair properties of ataxia telangiectasia (AT) fibroblasts following exposure to gamma radiation demonstrated that diploid strains from AT patients are impaired in DNA repair. The disappearance rate of gamma endonuclease-susceptible sites in three AT strains was much slower than in two normal strains; this strongly suggests that the AT strain lacks a fully functional gamma endonuclease that is considered to initiate excision repair. The response rate of AT strains to UV radiation was comparable to that of the normal strains, indicating that the malfunction is specific.

2020 DNA-DEPENDENT RNA-POLYMERASE OF IRRADIATED ANIMAL ORGANS. PART 6. ROLE OF ENZYME CHANGES IN THE DISTURBANCE OF TRANSCRIPTION PROCESSES. (Rus.) Likhoded, V. S. (Res. Inst. Medical Radiology, Kharkov, USSR); Stoliarov, I. V.; Savenko, L. N.; Paskevich, I. F. *Radiobiologiia* 15(5): 741-744; 1975.

The personal findings of the author and studies in the literature on DNA-dependent RNA-polymerase in the liver and spleen of irradiated rats attest to the participation of enzyme changes in determining the level of RNA synthesis in these organs. Investigations have established that synthesis of RNA-polymerases in both undergoes essential changes following irradiation of animals. In the liver and spleen, changes in RNA synthesis depend simultaneously upon the state of the enzyme and DNA. RNA synthesis is inhibited much more significantly with an irradiated matrix and a nonirradiated enzyme than with a nonirradiated matrix and an irradiated enzyme. The results of studies of RNA-polymerase are consistent with data from investigations of RNA synthesis in the liver and spleen of irradiated rats. They emphasize the parallel changes of the transcribing complex at various stages of its functioning, one element of which is impairment of the synthesis and structural integrity of DNA-dependent RNA-polymerase.

2021 IS CHROMATID-TYPE DAMAGE IN ATAXIA TELANGIECTASIA AFTER IRRADIATION AT G_0 A CONSEQUENCE OF DEFECTIVE REPAIR? (Eng.) Taylor, A. M. R. (Medical Sch., Univ. Birmingham, Birmingham B15 2TJ, UK); Metcalfe, J. A.; Oxford, J. M.; Harnden, D. G. *Nature* 260: 441-443; 1976.

The radiosensitivity of patients with ataxia telangiectasia (AT) was studied at the chromosomal level in blood lymphocytes x-irradiated at different cell cycle stages. Heparinized blood was taken from four patients and five controls, and the lymphocytes were exposed to 200 and 400 rads in G_0. The AT lymphocytes did not show rings and dicentrics at a consistently higher frequency than the controls, but the total number of deleted fragments was greater. The AT cells also showed chromatid-type damage marked by the appearance of chromatid interchanges, especially triradials. Irradiation during G_2 induced a high level of chromatid gaps and breaks in comparison with controls, and there was again a high frequency of chromatid interchanges. The results indicate that x-ray induced chromatid damage can occur after irradiation at G_0.

2022 ANALYSIS OF MONOMORPHOUS MARKER GENES IN POPULATIONS AS A METHOD OF EVALUATING ENVIRONMENTAL MUTAGENICITY. (Rus.) Dubinin, N. P. (Inst. General Genetics, Acad. Sciences USSR, Moscow, USSR); Altukhov, Iu. P.; Salmenkova, E. A.; Milishnikov, A. N.; Novikova, T. A. *Dokl Adad Nauk SSSR* 225(3): 693-696; 1975.

The effectiveness of monomorphous marker gene analysis in determining environmental mutagenicity was studied using gynecogenetic unisexual populations of *Carassius auratus gibelio* Bloch contained in tanks experimentally contaminated with radioactive isotopes. Rare variants found in tanks with control fish and reflecting the pressure of spontaneous mutations rose to high concentrations in some experimental tanks. New variants manifested a frequency range indicating the pressure and perhaps the selection of mutations. The noticeable increase in the experimental populations of the share of rare albumin variants occurring at low frequencies (45% as opposed to 30% in control tanks) clearly attested to the intensification of mutation in the experimental populations. The findings establish a marked divergence among the compared populations that was conditioned primarily by mutation induced by radionuclides.

2023 LUNG FUNCTION CONSEQUENCES OF DUST EXPOSURE IN ASBESTOS CEMENT MANUFACTURING PLANTS. (Eng.) Weill, H. (Tulane Univ. Sch. Medicine, 1700 Perdido St., New Orleans, LA 70112); Ziskind, M. M.; Waggenspack, C.; Rossiter, C. E. *Arch Environ Health* 30(2): 88-97; 1975.

In a comprehensive study of health effects associated with the mixed dust exposure in the asbestos cement industry, clinical, radiographic, lung function, and dust exposure data on 859 workers in two plants were collected. Evidence is presented supporting a dose-response relationship between indexes of dust exposure and lung function, similar to the previously reported relationship with extent of x-ray film changes using the ILO U/C classification. Lung volumes and maximum expiratory flow rates decrease in relation to increasing cumulative dust exposure, while pulmonary diffusing capacity (DL) is not dust-dose related. Workers exposed to crocidolite had smaller lung volumes, lower expiratory flow rates, and reduced DL when compared with those exposed to chrysotile. When the study population is divided into exposure groups, data suggest that the chest x-ray film will reveal small opacities as early as significant functional changes can be detected, but individuals may have functional reduction prior to the appearance of x-ray film changes. A threshold dust level has also been established for the industry, below which significant reduction in mean values cannot be demonstrated.

2024 SURVEILLANCE FOR CARCINOGENESIS IN WOMEN USING CU-IUD FOR CONTRACEPTION. (Eng.) Luthra, U. K. (Indian Registry Pathology [ICMR], New Delhi-110001, India); Mitra, A. B.; Bhinder, G.; Bhatnagar, P.; Saxena, N. C. *Indian J Med Res.* 63(12): 1787-1793; 1975.

Six hundred and thirty-seven women using the intrauterine device Cu-IUD were studied for cytological abnormalities in the genital tract epithelia. Follow up cytological data of 24 mo of use were analyzed. During use of Cu-IUD some patients in whom the epithelium was initially negative or inflammatory showed dysplasia. One case of severe dysplasia progressed to carcinoma in situ, although the follow up period was too short to relate its occurrence to the use of Cu-IUD. The results demonstrate the need for a long-term study of women using Cu-IUD.

2025 A COMMENTARY ON OZONE DEPLETION THEORIES. (Eng.) Scorer, R. S. (Imperial Coll., London, England). *Atmospheric Environ* 10(2): 177-180; 1976.

Fallacies of the theories of ozone depletion by NOx and chlorine are discussed. NOx was declared to be a danger because of its natural absence from the stratosphere, the stratosphere being widely assumed not to contain anything much that can be rained out in the troposphere. This assumption is erroneous and there are many natural pollutants, including NOx and methyl chloride, which are present in the stratosphere in unknown quantities. The basic assumption of the depletion theories is that the vertical displacement of chemical species is adequately represented by a diffusion coefficient. However, almost every chemical species is adequately represented by a diffusion coefficient. However, almost every chemical species which has been measured with sufficient vertical resolution has shown a layering, often with variations of over 50% in 1 km or less. The layering is a consequence of the shearing into sheets of originally more compact bodies of air which cross the tropopause, and the geography of the crossing is not understood. The diffusion theory also contains the erroneous assumption that every upward progressing species has the chance and the necessity to react with every downward progressing species when they pass through the same altitude. Thus, it is unlikely that a quantitative prediction of either ozone incidence of depletion will be possible in this century, and there is no prospect of indicating whether interference with ozone might produce climatic effects which are advantageous or disadvantageous to man. Ozone depletion by pollution has never been observed, but even accepting the most extreme predictions of ozone depletion, there is almost no basis for predicting any biological consequences.

2026 BREAST CARCINOMA IN PARABIONT RATS WITH RADIATION, UNILATERAL NEPHRECTOMY, AND OOPHORECTOMY (Proceedings Abstract). (Eng.) Brown, C. E. (Cancer Res. Inst., New England Deaconess Hosp., Boston, MA 02215); Warren, S. *Proc Am Assoc Cancer Res* 17: 47; 1976.

2027 FUNDAMENTAL AND PRACTICAL ASPECTS OF IRRADIATION IN EXPERIMENTAL ONCOLOGY. (Eng.) Barendsen, G. W. (Radiological Inst. TNO, 151, Lange Kleiweg, Rijswijk (ZH), The Netherlands). *Int Union Cancer Tech Rep Ser* 20: 69-75; 1975.

2028 X RAY TRANSFORMATION IN UTERO (Proceedings Abstract). (Eng.) Borek, C. (Coll. Physicians and Surgeons, Columbia Univ., New York, NY 10032); Hall, E. J. *Proc Am Assoc Cancer Res* 17: 113; 1976.

2029 TRANSFORMATION OF CULTURED C3H/10T1/2 CELLS BY ULTRAVIOLET LIGHT AND PHORBOL ESTER (Proceedings Abstract). (Eng.) Mondal, S. (McArdle Lab., Univ. Wisconsin, Madison, WI 53706); Brankow, D. W.; Heidelberger, C. *Proc Am Assoc Cancer Res* 17: 151; 1976.

2030 CHARACTERIZATION OF INTRACYTOPLASMIC RNA DIRECTED DNA POLYMERASE FROM A LYMPHOID CELL LINE OF A RADIATION INDUCED LYMPHOMA IN NIH SWISS MICE (Proceedings Abstract). (Eng.) Donlon, J. A. (Lab. Tumor Cell Biology, NCI, NIH, Bethesda, MD 20014); Sarin, P. S.; Friedman, B. P.; Gallo, R. C. *Proc Am Assoc Cancer Res* 17: 70; 1976.

2031 CHROMOSOME ABERRATIONS INDUCED IN HUMAN LYMPHOCYTES BY NEUTRON IRRADIATION. (Eng.) Lloyd, D. C. (Natl. Radiological Protection Board, Harwell, Didcot, Oxon OX11 ORQ, England); Purrott, R. J.; Dolphin, G. W.; Edwards, A. A. *Int J Radiat Biol* 29(2): 169-182; 1976.

See also:

* (Rev): 1810, 1812, 1813, 1814, 1846, 1847, 1848, 1849
* (Chem): 1932, 1963, 1999, 2003, 2011
* (Viral): 2105
* (Immun): 2189
* (Path): 2228, 2253
* (Epid-Biom): 2330

2032 POLYPEPTIDE AND RNA COMPOSITION OF THE RETICULOENDOTHELIOSIS VIRUSES. (Eng.) Maldonado, R L. (Dept. Microbiology, Univ. Texas at Austin, Austin, TX 78712); Bose, H. R. *Intervirology* 5(3/4): 194-204; 1975.

The RNA and polypeptide composition of chick syncytial virus (CSV) and duck infectious anemia virus (DIAV) was investigated and compared to that of reticuloendotheliosis virus (REV) strain T, the prototype of the newly recognized REV group of viruses. CSV and DIAV contained genomic RNA species that cosedimented with those of REV in sucrose gradients. Five or six polypeptides, two of which were glycoproteins, consistently appeared in CSV and DIAV preparations. The major nonglycosylated polypeptides and glycoproteins of CSV and DIAV comigrated with the corresponding polypeptides of REV strain T. The failure of the genomic RNA species and the glycoproteins of avian tumor viruses to comigrate suggests that the REV complex is a more homogeneous group.

2033 MECHANISM OF RELEASE OF ACTIVE α SUBUNIT FROM DIMERIC αβ AVIAN MYELOBLASTOSIS VIRUS DNA POLYMERASE. (Eng.) Papas, T. S. (Lab. Tumor Virus Genetics, Natl. Cancer Inst., Bethesda, MD 20014); Marciani, D. J.; Samuel, K.; Chirikjian, J. G. *J Virol* 18(3): 904-910; 1976.

Storage of the dimeric (αβ) form of avian myeloblastosis virus (AMV) DNA polymerase in glycerol resulted in the release of the smaller α subunit, as detected by glycerol gradient sedimentation. Analysis by sodium dodecyl sulfate polyacrylamide gel electrophoresis of enzyme stored in glycerol showed the concomitant appearance of several polypeptides and a lowering in the level of both β and α components. This reduction was apparently the result of cleavages introduced by traces of hydrolytic activity present in glycerol samples. An enhancement of the α subunit released, as detected by activity profile, was also achieved upon direct but limited exposure of purified AMV DNA polymerase to carboxymethyl cellulose-bound trypsin matrix. Electrophoretic analysis of digested enzyme revealed a progressive fragmentation, with simultaneous increase in the α subunit and decrease in the β subunit. When the concentrations of glycerol were varied between 0 and 50%, the α subunit activity increased and the αβ activity decreased. The release of α subunit was independent of temperature. The apparent proportional release of the α subunit may be the result of intrinsic proteolytic activity in the homogeneous enzyme, trace amounts of proteolytic activity that copurified with AMV DNA polymerase, or contaminating hydrolytic activity in glycerol samples.

2034 SUBUNIT STRUCTURE OF THE GLYCOPROTEIN COMPLEX OF AVIAN TUMOR VIRUS. (Eng.) Leamnson, R. N. (Wistar Inst. Anatomy and Biology, Philadelphia, PA 19014); Halpern, M. S. *J Virol* 18(3): 956-968; 1976.

To characterize the structure of the glycoprotein complex of avian tumor virus, primary cultures of chicken embryo cells were infected with avian sarcoma virus (ASV) B_{77} and the Prague strain of the Rous sarcoma virus (RSV). The virions were labeled with [^{3}H] or [^{14}C] amino acids and analyzed by polyacrylamide gel electrophoresis. The envelope glycoprotein of avian tumor virus was linked by disulfide bonds in a structure designated as viral glycoprotein (VGP), which contained one molecule of gp85 linked to one of gp37. Under nonreducing conditions, VGP was the only glycoprotein component that was stable in the presence of ionic detergent. In the presence of nonionic detergent, however, two or more VGP's were associated in discrete complexes. The disulfide bonds linking viral glycoprotein were formed before the release of virus from infected cells.

2035 IMPAIRED HOST DEFENSE AGAINST XC CELL-INDUCED TUMORS IN THYMECTOMIZED AND IN BURSECTOMIZED CHICKENS. (Eng.) Lam, K. M. (Temple Univ. Sch. Medicine, Philadelphia, PA 19140); Linna, T. J. *Cancer Res* 36(5): 1710-1711; 1976.

XC cells from the tumor of a rat inoculated with the Prague strain of Rous sarcoma virus were used to induce tumors in chickens thymectomized or bursectomized shortly after hatching. Thymectomized chickens had a significantly higher incidence of tumors, larger tumors, and a higher tumor mortality, than controls, when both groups were given 5 x 10^{6} XC cells into the wing webs. Bursectomy could significantly influence the tumor size only. The results suggest that the capacity of XC cells to induce tumors, and the growth of such tumors, are subject to immunological influence, with the thymus playing a major and the bursa of Fabricius a minor role under the conditions used.

2036 X-GP70: A THIRD MOLECULAR SPECIES OF THE ENVELOPE PROTEIN GP70 OF MURINE LEUKEMIA VIRUS, EXPRESSED ON MOUSE LYMPHOID CELLS. (Eng.) Tung, J.-S. (Memorial Sloan-Kettering Cancer Center, New York, NY 10021); Shen, F.-W.; Fleissner, E.; Boyse, E. A. *J Exp Med* 143(4): 969-974; 1976.

Three variants of the gp70 envelope component of MuLV are now recognizable serologically: Gix-gp70, O-gp70, and X-gp70. The last of these, X-gp70, has so far been found only in mice or cells producing abundant C-type virus. This distinguishes X-gp70, provisionally, from the Gix-gp70 and O-gp70 variants, each of which can be expressed on normal thymocytes without accompanying virus production, as exemplified by mouse strains 129 and B6, respectively. The X-gp70 genotype, however, is not limited to strains of mice-producing abundant virus, because X-gp70 leukemias occur in strains of mice that do not produce a great deal of virus and whose thymocytes and other tissues are X-gp70-; this is analogous to the appearance of Gix+ leukemias in Gix- mouse strains. Gix-gp70 and O-gp70 are coded on two unlinked loci and it is assumed that X-gp70 constitutes a third independent loci.

2037 COENZYME Q DEFICIENCY IN MICE FOLLOWING INFECTION WITH FRIEND LEUKEMIA VIRUS. (Eng.) Bliznakov, E. (New England Inst., PO Box 308, Ridgefield, CT 06877); Casey, A.; Kishi, T.; Kishi, H.; Folkers, K. *Int J Vitam Nutr Res* 45: 388-395; 1975.

The specific activities of the succinate dehydrogenase-coenzyme Q reductase were assayed on mitochondrial preparations of this enzyme from spleen, liver, blood, and peritoneal macrophages of male Swiss-Webster mice infected with Friend leukemia virus, and control mice. There were significant increases in the deficiency of coenzyme Q enzyme activity in the spleen and blood of infected mice as the infection progressed. No significant deficiency was observed in the liver or the peritoneal macrophages. The deficiency and splenomegaly that developed during infection seemingly correlated with previous data showing that administration of coenzyme Q caused a reversal of splenomegaly and a reduction in mortality. A limiting factor in the resistance of mice to Friend leukemia virus appears to be the availability of coenzyme Q.

2038 MICROBIAL IRON CHELATES WITH IRON DONOR PROPERTIES IN HEMOGLOBIN-SYNTHESIZING CELLS. (Eng.) Barnekow, A. (Institut fuer Biologie II, Lehrstuhl Mikrobiologie I, Universitaet Tuebingen, D-74, Tuebingen, Berghof, W. Germany); Winkelmann, G. *Exp Hematol* 4(2): 70-74; 1976.

Iron incorporation into Friend virus-infected leukemic murine spleen cells was investigated by use of the two ^{55}Fe trihydroxamates, fusigen and ferricrocin. Label incorporation was measured by isolation of hemoglobin after dimethylsulfoxide (DMSO)-induced hemoglobin synthesis and compared with incorporation of labeled ferric citrate. Approximately 8.8% of the iron added as ferric iron and about 6.7% of the videramine iron were taken up. The main part of the radioactivity was associated with the higher molecular weight fractions of the cells, suggesting that only minimal amounts of free iron chelates occurred intracellularly. Ion exchange chromatography showed that the ratio between the labeled hemoglobin and the labeled nonheme proteins was higher when the cells were induced by DMSO. The absolute amount of label associated with the whole protein fraction was generally higher when iron ferric citrate was used, but the ratio of newly incorporated iron into hemoglobin and nonhemoglobin protein was nearly identical whatever type of chelate was used by the cells. The results suggest that during erythroid maturation, some low molecular weight iron chelates of the videramine type can possibly bypass transferrin-dependent iron transport and can serve as iron donors for hemoglobin synthesis.

2039 CHANGES IN HISTONE F2A2 ASSOCIATED WITH PROLIFERATION OF FRIEND LEUKAEMIC CELLS. (Eng.) Blankstein, L. A. (Tufts Univ. Sch. Medicine, Boston, MA 02111); Levy, S. B. *Nature* 260(5552): 638-640; 1976.

Changes in histone f2a2 associated with proliferation were studied in Friend leukemic cells. Dimethylsulfoxide (DMSO)-inducible and noninducible lines were established from the spleen cells of leukemic DBA/2J mice. Separation of the histones from these lines on acid-urea Triton gels showed an increase in the $f2a2_2$ fraction of the DMSO-inducible cells, so that the ratio of $f2a2_1$ to $f2a2_2$ approached 1:1. Prior to the development of DMSO-inducibility the ratio was about 2:1, and the original tissue had a ratio of 3:1. The inducible cells grew when implanted sc in mice without losing their acquired properties and readapted immediately to in vitro conditions. The changes in the histone subfractions are suggestive of either a chemical modification of the $f2a2_1$ fraction or a change in the synthesis of the two subtypes.

2040 THE PHAGOCYTIC ACTIVITY OF THE RETICULOENDOTHELIAL SYSTEM OF MICE INFECTED BY RAUSCHER LEUKEMIA VIRUS. (Eng.) Seidel, H. J. (Dept. Clinical Physiology, Univ. Ulm, 79 Ulm/Donau, W. Germany); Nothdurft, W. *J Reticuloendothel Soc* 19(3): 173-182; 1976.

The conventional carbon clearance technique was used to test reticuloendothelial phagocytic function in Rauscher leukemia virus (RLV) infected female CBA/J and Balb/c mice. In CBA/J mice an increased clearance of carbon from the blood was found. It was associated with a high activity of liver macrophages. In the spleen, histologic sections revealed a progressive loss of responsive macrophages as the organ enlarged following infection. This loss was in agreement with earlier findings on the inability of the spleen to produce colony stimulating activity late after RLV infection. It is not known if these cells die as a consequence of the interaction with the reticuloendothelial system or are lost due to the destruction of their specific microenvironment. In contrast to these findings in CBA/J mice, the phagocytic indices of Balb/c mice were not significantly influenced during the course of Rauscher leukemia development. The differences between the two strains may originate in the development of Rauscher leukemia or in the reticuloendothelial system itself.

2041 IMMUNOGENIC AND IMMUNOSUPPRESSIVE COMPONENTS IN SOLUBLE PREPARATIONS FROM MOLONEY MURINE LEUKEMIA VIRUS-INDUCED TUMOR CELLS. (Eng.) Brandchaft, P. B. (Lab. Viral Carcinogenesis, Natl. Cancer Inst., Bethesda, MD 20014); Aoki, T.; Silverman, T. N. *Int J Cancer* 17(5): 678-685; 1976.

Soluble extracts from Moloney virus-induced leukemia cells of C57Bl/6 and BALB/c male mice were shown to contain immunogenic and immunosuppressive components that were divided into two classes based on their ability to combine with humoral antibody to inhibit cytotoxic activity or to stimulate blastogenesis in normal syngeneic lymphocytes. Immunosuppressive components were demonstrated by the inhibition of DNA synthesis in normal syngeneic lymphocytes and suppression of a mixed lymphocyte reaction. Stimulating components in many soluble preparations were completely masked by immunosuppressive components. However, all three components were resolvable by Sephadex G200 chromatography.

2042 INDUCTION OF AN ENDOGENOUS B-TROPIC TYPE C RNA VIRUS FROM SWR/J MOUSE EMBRYO CELLS IN TISSUE CULTURE.

(Eng.) Stephenson, J. R. (Natl. Cancer Inst., Bethesda, MD 20014); Aaronson, S. A. *Virology* 70(2): 352-359; 1976.

SWR/J mouse embryo cells were shown to be inducible by iododeoxyuridine to release a mouse cell-tropic virus that preferentially replicated in SC-1 and BALB/c cells. The inducibility of this B-tropic-like virus from clonal lines of SWR/J cells established that the virus was present within all cells of the SWR/J strain. The N-tropic and xenotropic endogenous viruses were not activated. The Fv-1 genotype of SWR/J embryo cells is Fv-1nn and so makes the cells nonpermissive for B-tropic virus replication. The nonpermissiveness partially accounts for the inability of the B-tropic endogenous virus of SWR/J cells to become established following chemical activation in tissue culture.

2043 PRODUCTION OF B-TROPIC MURINE LEUKEMIA VIRUS BY SOMATIC CELL HYBRIDS BETWEEN MOUSE PERITONEAL MACROPHAGES AND SIMIAN VIRUS 40-TRANSFORMED HUMAN CELLS.

(Eng.) Heubner, K. (Wistar Inst. Anatomy and Biology, Philadelphia, PA 19104); Croce, C. M. *J Virol* 18(3): 1143-1146; 1976.

To determine if the hybrid clones were producing exotropic murine leukemia virus (MuLV), simian virus 40 (SV40)-transformed human cells (LN-SV) were fused with BALB/c peritoneal macrophages (BALB/c x LN-SV) and with C57BL peritoneal macrophages (C57BL x LN-SV) and the hybrid clones, all of which had segregated human chromosomes and contained the entire complement of mouse chromosomes, were isolated. All 15 BALB/c x LN-SV hybrid clones produced varying titers (10 to 10^6 plaque-forming U/ml) of B-tropic MuLV, but none of the 9 C57BL x LN-SV hybrid clones produced detectable ecotropic MuLV.

2044 MURINE SARCOMA VIRUS DEFECTIVENESS: SEROLOGICAL DETECTION OF ONLY HELPER VIRUS REVERSE TRANSCRIPTASE IN SARCOMA VIRUS RESCUED FROM NONMURINE S+L- CELLS.

(Eng.) Peebles, P. T. (Natl. Cancer Inst., Bethesda, MD 20014); Gerwin, B. I.; Scolnick, E. M. *Virology* 70(2): 313-323; 1976.

Murine sarcoma virus (MSV) defectiveness was studied by examining MSV rescued by RD-114 virus superinfection of both dog and human heterologous host cells nonproductively transformed by the S+L- strain of Moloney MSV (S+L- cells). The rescued MSV pseudotype was present in excess over the RD-114 helper virus. The biologically determined virus ratio corresponded to that determined by virus nucleic acid hybridizations. The only detectable RNA-dependent DNA polymerase present in the rescued MSV virions was that of RD-114 helper virus. No murine virus polymerase was detectable within the virions. Cells producing infectious MSV and helper virions were not found to express murine polymerase within released MSV virions. Heterologous host-cell control mechanisms apparently do not prevent MSV polymerase expression in these cells. Instead, the rescued MSV virions acquire the polymerase protein from the rescuing helper virus, for it apparently lacks the genes for its own reverse transcriptase and thus requires, for production of infectious progeny, the functioning of a helper virus replication gene set supplying at least viral envelope antigen(s) and the core protein polymerase.

2045 MURINE MAMMARY TUMOR VIRUS: CHARACTERIZATION OF INFECTION OF NONMURINE CELLS.

(Eng.) Vaidya, A. B. (Inst. Medical Res., Camden, NJ 08103); Lasfargues, E. Y.; Heubel, G,; Lasfargues, J. C.; Moore, D. H. *J Virol* 18(3): 911-917; 1976.

Murine mammary tumor virus (MuTV) ''proviral'' DNA was detected in feline MuMTV infected feline and mink cells (CRFK-F2 kidney and CCL64 lung, respectively) by molecular hybridization using radioactive MuMTV complementary DNA as a probe. Kinetic analysis of MuMTV proviral DNA synthesis after infection showed that maximum MuMTV DNA synthesis was achieved by 8 hr; this was followed by a decline in detectable proviral DNA and eventual stabilization at a lower level. MuMTV synthesis in feline cells was greatly stimulated by the synthetic glucocorticoid dexamethasone. On the other hand, MuMTV synthesis in mink cells was at a much higher level in the absence of dexamethasone, and the stimulation with dexamethasone was not as marked as in the feline cells. This difference in response may be due to different function and hormone dependence of the organs from which they were derived. Thermal denaturation of hybrids between MuMTV complementary DNA and infected mink cell RNA revealed no difference from homologous hybrids.

2046 MOUSE MAMMARY TUMOR VIRUS AS A MODEL FOR VIRAL CARCINOGENESIS.

(Eng.) Gillette, R. W. (Meloy Labs. Inc., 6715 Electronic Drive, Springfield, VA 22151). *J Toxicol Environ Health* 1(4): 545-550; 1976.

The interaction of mammary tumor virus (MTV), hormonal factors, and genetic background in murine mammary tumorigenesis is discussed. Mammary adenocarcinomas positive for the virus typically contain large numbers of type B particles. MTV-S of C3H mice and MTV-P of R111 mice have the highest oncogenicity. The tumors in R111 mice generally have the greatest response to hormone levels. They exhibit episodes of remission that depend on the physiologic status of the host. Requirements for prolactin, cortisone, and insulin have been demonstrated in vitro. About 95% of the females that reach third parity develop positive tumors, while virgin females produce about 20% tumors. The latency of tumors in MTV negative strains is much greater than in positive strains. In a study of expressions of MTV antigens in milk samples from hybrid mice of high and low expressor strains, high expressor strains produced significant amounts of virus at first parity, while low expressor strains only produced antigen after several pregnancies. MTV-positive mammary tumor induction is a good model for the study of viral oncogenesis; with the appropriate genetic background, 100% mammary tumors can be obtained if adequate hormonal components are provided.

2047 EXPERIMENTAL INFECTION OF A CAT KIDNEY CELL LINE WITH THE MOUSE MAMMARY TUMOR VIRUS. (Eng.) Lasfargues, E. Y. (Inst. Medical Res., Camden, NJ 08103); Lasfargues, J. C.; Dion, A. S.; Greene, A. E.; Moore, D. H. *Cancer Res* 36(1): 67-72; 1976.

The cat kidney cell line, CRFK-F2, was inoculated in suspension and in monolayer culture with a purified mouse mammary tumor virus derived from RIII milk. A virus produced by the infected cells was identified by immunofluorescnece, electron microscopy, and RNA-directed DNA polymerase assays; it was a B-type virion that did not cross-react with mouse or feline leukemia-sarcoma viruses, had spikes on its envelope, and also had a RNA-directed DNA polymerase reaction typical of mouse mammary tumor virus. The producing cells were identified as cat cells by means of chromosome number, cytotoxic assays, and isoenzyme migratory patterns. A standardized method for the in vitro inoculation of cat cells was described. The mouse mammary tumor virus was seen replicating in cells from another species, offering an opportunity to study the kinetics of infection of the virus.

2048 HIGH FREQUENCY VARIATION IN MAMMARY TUMOR VIRUS EXPRESSION IN CELL CULTURE. (Eng.) Parks, W. P. (Natl. Cancer Inst., Bethesda, MD 20014); Hubbell, E. S.; Goldberg, R. J.; O'Neill, F. J.; Scolnick, E. M. *Cell* 8(1): 87-93; 1976.

In studying variation in viral expression in cell cultures, it was found that clonal derivatives of C3HMT murine mammary cell lines in culture demonstrated conversion of mammary tumor virus (MMTV) expression at a rate of approximately 6 per 100 clones. This alteration was largely unidirectional from a relatively high level to a 10-fold lower level (MMTVL). This high rate of MMTVL variant conversion was in contrast to the mutational rate (approximately 3/million cells) that governs the development of resistance to 6-thioguanine (TG) in the same mammary cells. In somatic cell hybrids between different MMTV TGr clones and mouse or hamster TK- cells, expression of constitutive levels of MMTV and responsiveness to dexamethasone induction was dominant. Thus MMTV expression was regulated by at least two levels of positive control, CIS-dominant constitutive expression and glucocorticoid stimulation, but the former was subject to a high rate of variant formation.

2049 CHARACTERIZATION OF THE ONCORNAVIRUS PARTICLES IN THE PLASMA OF GUINEA PIGS WITH L2C LEUKEMIA. (Eng.) Michalides, R. (Dutch Cancer Inst., Sarphatistraat 108, Amsterdam, The Netherlands); Schlom, J; Pearson, J.; Perk, K.; Dahlberg, J. *J Virol* 18(3): 1120-1130; 1976.

The biochemical and morphological features of the extracellular virus particles in the plasma of strain 2 guinea pigs carrying the transplantable L2C guinea pig leukemia were characterized and compared with those of the virus induced from normal guinea pig cells by treatment with 5-bromo-2'-deoxyuridine (BUdR). Inoculation of the leukemia cells into the guinea pigs resulted in the death of the animals within 12 to 15 days. Death was preceded by the simultaneous appearance in the plasma of (a) elevated leukocyte levels, (b) extracellular virus particles, and (c) a particle-associated RNA-directed DNA polymerase. This enzyme activity had a cation preference identical to that of the type B BUdR guinea pig virus; i.e., an Mg^{2+} optimum at 20 mM and no activity with use of Mn^{2+}. Competitive molecular hybridization studies also revealed that the plasma of leukemic guinea pigs contained approximately 2 x 10^{9} genome equivalents/ml of an RNA that is homologous to the RNA of the BUdR guinea pig virus. Morphological observations indicated that most, but not all, of the extracellular particles observed in leukemia plasma were derived from the intracisternal particles seen in the L2C tumor cells. The L2C tumor viruses and the BUdR-induced viruses are either two separate viruses or are related.

2050 ONCORNAVIRUS OF GUINEA PIGS: I. MORPHOLOGY AND DISTRIBUTION IN NORMAL AND LEUKEMIC GUINEA PIG CELLS. (Eng.) Fong, C. K. Y. (Yale Univ. Sch. Medicine, New Haven, CT); Hsiung, G. D. *Virology* 70(2): 385-398; 1976.

Two morphologically distinct types of oncornavirus particles were observed in leukemic guinea pig cells. Intracisternal A-type particles 90-100 nm in diameter predominated. Extracellular particles with dense core, approximately 90-110 nm in diameter, were only occasionally found in the interstitial spaces, but were predominant in plasma and sera of the same animals. Placental and fetal tissues obtained from normal guinea pigs showed only intracisternal A-type particles. Cultured guinea pig cells, when treated with 5-bromo-2'-deoxyuridine (BrdU), revealed many intracytoplasmic A-type particles 90-100 nm in diameter. Budding of these A-type particles at the cell membrane to form extracellular enveloped A-type particles was observed. Extracellular virus particles with dense cores, 110-120 nm in diameter similar to those found in leukemic guinea pigs, were abundant in the BrdU-treated cultures but did not require BrdU induction. The number of ''mature'' virus particles present in the tissue and plasma was directly related to the severity of the disease. The appearance of extracellular is concurrent with, but somewhat later than, the appearance of intracellular A-type particles and so supports the hypothesis that the A-type or immature virus particles are the precursors of the extracellular ''mature'' ones. The particles seen in the tissues of normal or leukemic guinea pigs and in BrdU-treated ones both have dense nucleoids and thick layers of dense material lining the envelope. The latter particles generally appeared to be somewhat larger and more often exhibited spikes on the envelope.

2051 ISOLATION OF SIMIAN VIRUS 40-TRANSFORMED INBRED HAMSTER CELL LINES HETEROGENEOUS FOR VIRUS INDUCTION BY CHEMICALS OR RADIATION. (Eng.) Kaplan, J. C. (Massachusetts General Hosp., Boston, MA 02114); Wilbert, S. M.; Collins, J. J.; Rakusanova, T.; Zamansky, G. B.; Black, P. H. *Virology* 68(1): 200-214; 1975.

Cloned cell lines were isolated after simian virus 40 (SV40) transformation of kidney cells of an inbred hamster strain. Considerable heterogeneity for the induction of infectious virus was observed between the lines (ranging from the spontaneous production of infectious virus to nonproducer characteristics). In spite of their differences in virus inducibility, all the clones were found to contain equivalent small numbers of SV40 genomes (1-2) per cell. The induction of infectious virus was studied after treating these clones with 4 agents causing strand breakage either directly or indirectly in DNA: mitomycin C, bromodeoxyuridine and visible light, UV irradiation or ^{60}Co gamma-irradiation. A direct dose-response relationship was established between virus yield and dose of inducing agent used. Yields of infectious virus in induced cells were increased by factors of 10^3-10^4 compared to untreated cultures. DNA damage and single-strand break formation might be early events in the induction of infectious SV40 from transformed cells by physical and chemical agents.

2052 BIOSYNTHESIS OF PLASMA MEMBRANE COMPONENTS BY SV40-VIRUS-TRANSFORMED 3T3 MOUSE CELLS TEMPERATURE SENSITIVE FOR EXPRESSION OF SOME TRANSFORMED CELL PROPERTIES. (Eng.) Shopsis, C. (Dept. Medical Biophysics, Univ. Toronto, Toronto M4X 1K9, Canada); Sheinin, R. *Biochim Biophys Acta* 433(1): 101-117; 1976.

The plasma membranes of an SV40-transformed 3T3 cell line temperature sensitive (ts) for the transformed growth phenotype (ts H6-15 cells) were studied. The cell lines varied little as a function of temperature of cultivation. No significant differences were seen when the electrophoretic patterns of polypeptides of the plasma membranes of ts H6-15 cells, grown through 3-4 generations in medium containing radioactive leucine (32 C and 39 C temperatures) were compared. Plasma membranes derived from cells similarly grown in medium with radioactive glucosamine indicated that extensive alterations in the intrinsic glycopeptides occurred in association with alteration in growth phenotype. A shift towards decreased synthesis of large molecular wt (approximately = 100,000-160,000) glycopeptides occurred in cells grown at the temperature of non-transformed growth (39 C). A decrease in amount of a 120,000 molecular wt glycopeptide at 39 C was the most prominent of these alterations. The surface exposure of polypeptides and glycopeptides of intact cells grown at 32 and 39 C was studied using lactoperoxidase-catalyzed iodination, $NaBH_4$ reduction of galactose oxidase-treated cells, and metabolic-labeling with glucosamine of trypsin-sensitive molecules. No major qualitative differences between whole cell extracts or between plasma membrane preparations of cells cultivated at the permissive and nonpermissive temperatures were found. The formation and surface exposure of a trypsin-sensitive, 240,000 molecular weight polypeptide appeared not to be ts in ts H6-15 cells. The growth phenotype of ts H6-15 cells was not correlated with a number of the gross biochemical modifications previously implicated in the mechanism of virus transformation.

2053 INDUCTION OF GENE MUTATIONS AND CHROMOSOMAL ABERRATIONS BY SIMIAN VIRUS 40 IN CULTURED MAMMALIAN CELLS. (Eng.) Marshak, M. I. (Kurchatov Inst. Atomic Energy, Moscow, USSR); Varshaver, N. B.; Shapiro, N. I. *Mutat Res* 30(3): 383-395; 1975.

The induction of gene mutations by SV40 was studied in aneuploid human and Chinese hamster cells. In Chinese hamster cells, SV40-induced chromosome aberrations was also studied. SV40 penetrated into the cells of both lines and induced synthesis of the T antigen. The efficiency of infection in Chinese hamster cells was also tested by their ability to form colonies in medium lacking the serum growth factor. The maximal number of cells with serum growth factor independence was observed on the first day after infection. When hamster cells had been maintained in ''factor-free medium'' for the first 2 passages after infection, a sub-line was isolated (which synthesized T antigen 60 days after exposure to SV40). This was considered to be an indirect proof of the integration of viral genome into host chromosome. A significant increase in the frequency of chromosomal aberrations was detected in SV40-infected Chinese hamster cells. It was observed on the first and second days after treatment. The most numerous were the chromosome and chromatid breaks, distributed randomly in five morphological groups according to the chromosome length. Viral genome integration, gene mutations, and chromosomal aberrations might have common molecular mechanisms.

2054 THE INDUCTION OF SV40-TRANSFORMED CHINESE HAMSTER AND MOUSE KIDNEY CELLS BY MITOMYCIN C. (Eng.) Morris, A. G. (Institut de Recherches Scientifiques sur le Cancer, Centre National de la Recherche Scientifique, Boite Postale No. 8, F-94800 Villejuif, France); Lavialle, C.; Suarez, H.-G.; Cassingena, R. *Intervirology* 5(5): 305-312; 1975.

Mitomycin C (MC) induced SV40 production in three lines of semi- or nonpermissive SV40-transformed cells. The production of virions by a line of semipermissive, virus-shedding Chinese hamster kidney cells was increased 1000-fold by MC treatment; the proportion of infectious centers and V antigen-containing cells was increased to a lesser degree, suggesting that both the burst per cell and the number of virus-producing cells were increased. MC treatment induced the production of small amounts of infectious DNA and virions in one line of nonpermissive mouse kidney cells and infectious DNA apparently alone in another.

2055 DNA REPLICATION IN SV40 INFECTED CELLS: X; THE STRUCTURE OF THE 16 S GAP CIRCLE INTERMEDIATE IN SV40 DNA SYNTHESIS. (Eng.) Laipis, P. J. (Box 724, J Hillis Miller Health Center, Univ. Florida, Gainesville, FL 32610); Sen, A.; Levine, A. J.; Mulder, C. *Virology* 68(1): 115-123; 1975.

On completion of SV40 DNA replication, the two newly replicated daughter molecules segregate, producing 2 circular intermediates that sediment at 16 S. One or both of these segregants contain a single-stranded region or gap, bounded by a 3'-hydroxyl and 5'-phosphate group. Treatment of these intermediates in vitro with T4 DNA polymerase and *Escherichia coli* polynucleotide ligase repaired this gap and produced a closed circular molecule. The position of this gap or single-stranded region was determined with the aid of restriction enzymes (*Eco*Ri HpaII) and was found to be at or very close to the terminus of DNA replication (approximately 0.15 U). The segregation of the 2 interlocked daughter molecules of SV40 DNA might occur before DNA replication is complete.

2056 DNA REPLICATION IN SV40-INFECTED CELLS. XI. THE PROPERTIES OF SV40 DNA AND NUCLEOPROTEIN COMPLEX SYNTHESIZED IN THE PRESENCE OF CYCLOHEXIMIDE. (Eng.) Sen, A. (Dept. Biochemical Sciences, Moffet Labs., Princeton Univ., Princeton, NJ 08540); Laipis, P. J.; Levine, A. J. *Intervirology* 5(3/4): 122-136; 1975.

Cycloheximide inhibited simian virus 40 (SV40) DNA synthesis in productively infected African green monkey kidney cells. The residual viral DNA synthesized in the presence of this drug was deficient in superhelical turns, as measured by band sedimentation in several concentrations of ethidium bromide. The superhelical density of SV40 DNA synthesized in the presence of cycloheximide was about one-half that of viral DNA produced in its absence. Ribonuclease H and alkali treatment were employed to determine if ribonucleotides could be detected in closed circular SV40 DNA synthesized in the presence of cycloheximide. Although both these approaches detected ribonucleotides in mitochondrial DNA, no indication of ribonucleotides in SV40 DNA synthesized in the presence of cycloheximide was found. The SV40 nucleoprotein complex synthesized in the presence of cycloheximide had a slower sedimentation rate (35S) and a higher buoyant density (1.54 g/cm^3) than the complex made in the absence of this drug (50S; 1.47 g/cm^3). The protein:DNA ratio of the SV40 nucleoprotein complex, normally about 0.9, was reduced to about 0.6 when the complex was synthesized in the presence of cycloheximide.

2057 EARLY EVENTS DURING SUBSTRATE ADHESION OF NORMAL AND VIRUS-TRANSFORMED MOUSE FIBROBLASTS. (Eng.) Mapstone, T. B. (Sch. Medicine, Case Western Reserve Univ., Cleveland, OH 44106); Culp., L. A. *J Cell Sci* 20(3): 479-495; 1976.

The relationship between attachment of Balb/c 3T3 cells and their Simian virus 40 (SV40) transformants (SVT$_2$) to glass or plastic substrates and deposition of substrate-attached material (SAM--proteoglycans implicated in substrate adhesion) was examined very early after inoculation of cells subcultured with ethylenebis(oxyethylenenitrilo)-tetraacetic acid (EGTA). Cycloheximide and colchicine minimally affected the kinetics or short-term stability of attachment of cells or deposition of SAM. SAM deposition onto the substrate began immediately after inoculation of cells and was maximal prior to the highest cell attachment level (30-40 min after inoculation). At 4 C, there was no attachment of cells to the substrate and no deposition of leucine- or glucosamine-radiolabeled SAM on to the substrate. 3T3 cells deposited SAM to a maximal level earlier during the attachment process than SV40-transformed cells. The SVT$_2$ cells deposited much smaller amounts of SAM (measured on a per-cell basis) to 3T3 SAM-coated substrates during attachment processes, whereas 3T3 cells and concanavalin A (con A) revertant variants of SVT$_2$ cells, which have regained density-dependent inhibition of growth, deposited identical amounts of SAM (per-cell) on untreated or SAM-coated substrates. Serial attachment experiments with SVT$_2$ cells indicated that all SVT$_2$ cells reduced their deposition amounts on SAM-coated substrates, rather than there being an ability of a small proportion of cells to attach preferentially to SAM-coated substrates while being unable to deposit SAM themselves. The data are consistent with the presence of a sizeable pool of SAM-like proteoglycans being present on the surface of EGTA-removed cells whose deposition may be a requirement for, but may not necessarily be sufficient for, stable adhesion cells to the substrate.

2058 PLASMIN-MEDIATED AGGLUTINATION BY CONCANAVALIN A OF 3T3 CELLS COCULTURED WITH SV40-3T3 TRANSFORMANTS. (Eng.) Whur, P. (Marie Curie Memorial Foundation, Oxted, Surrey, UK); Koppel, H.; Urquhart, C.; Williams, D. C. *Nature* 260(5553): 709-710; 1976.

The plasminogen-dependent enhancement of agglutination by concanavalin A (con A) of untransformed cells in coculture with transformed cells was studied. When Swiss mouse 3T3 cells were grown in various sera they were generally only slightly agglutinable; however, when cocultured with simian virus 40-transformed 3T3 cells they became highly agglutinable. 3T3 cells incubated in serum-free medium conditioned by four 24-hr exposures to transformed cells showed enhanced agglutination in con A compared with those in unconditioned medium. Evidence indicated that the enhancement was attributable to the interaction of an activator from the transformed cells with a plasminogen.

2059 LIMITATIONS AND UTILITY OF A CYTOLYTIC ASSAY FOR MEASURING SIMIAN VIRUS 40-INDUCED CELL SURFACE ANTIGENS. (Eng.) Pancake, S. J. (Natl. Cancer Inst., Bethesda, MD 20014); Mora, P. T. *Cancer Res.* 36(1):88-94; 1976.

Antisera were produced against an SV40-transformed cell line in the syngeneic AL/N mouse. With the use of a microcytolytic assay, the specificity of antisera produced by various immunization schedules and their ability to lyse numerous SV40-transformed cell lines was determined. Various AL/N mouse cell lines, newly transformed by SV40 and cloned, were lysed by the antisera. When tumors were induced by SV40-transformed cells in the syngeneic mouse and cell lines were reestablished from tumors (and such procedures were repeated), the susceptibility to serum-mediated cytolysis of the sublines was the same as that of the original SV40-transformed cell line. Polyoma virus-transformed AL/N cell lines were also lysed; AL/N embryo cells, untransformed by SV40 or by polyoma, were not. SV40-transformed T-antigen-positive BALB/c mouse or hamster cell lines or a T-antigen-positive tissue cultured human cell were also resistant to lysis. A competition type of microassay demonstrated specific inhibition of the serum-mediated cytolysis by all of the SV40 T-antigen-positive cell lines tested. SV40 and polyoma virus transformation might result in the appearance of partially common cell surface antigens.

2060 THE STRUCTURAL PROTEINS OF SV40 AND POLYOMA VIRUS. (Eng.) Hirt, B. In: *Tumor Virus-Host Cell Interaction.* Edited by A. Kolber. (New York: Plenum Press): pp. 117-125; 1975.

The structural proteins of polyoma and SV40 virus were investigated by gel electrophoresis and methionine peptide analysis. Wild-type polyoma virus was grown at high multiplicity on primary mouse kidney cells and SV40 strain 777 was passaged and grown at high multiplicity on established African green monkey cells. In some cases ^{35}S-methionine (10-50 µCi/ml) was added 24 hr after infection. The methionine-containing peptides were revealed by autoradiography. Disrupted polyoma virus showed six polypeptides on polyacrylamide gels, the three smallest of which were absent in empty capsids. The major capsid protein migrated with a mobility corresponding to a molecular wt of 47,000 daltons; the two minor capsid proteins had a molecular wt of 35,000 and 23,000 daltons. The small polypeptides, which seemed to be contained in the core of the virus, had a molecular wt of 10,000-15,000 daltons. The protein pattern of SV40 was similar, except that the major protein of SV40 was always preceded by a satellite band. Gel electrophoresis and methionine peptide analysis indicated that the small noncapsid proteins behaved like histone of the host cells. Labeling of mouse kidney cells with ^{14}C-arginine for 24 hr prior to infection indicated that histones synthesized before infection were incorporated into the viral particles. The fact that host histone are bound to the small DNA of SV40 and polyoma viruses provides a convenient model for study of histone DNA interactions in mammalian cells.

2061 DEMONSTRATION OF INFECTIOUS DNA IN TRANSFORMED CELLS. III. CORRELATION OF DETECTION OF INFECTIOUS DNA-PROTEIN COMPLEXES WITH PERSISTENCE OF VIRUS IN SIMIAN ADENOVIRUS SA7-INDUCED TUMOR CELLS. (Eng.) Butel, J. S. (Baylor Coll. Medicine, Houston, TX 77025); Talas, M.; Ugur, J.; Melnick, J. L. *Intervirology* 5(1/2): 43-56; 1976.

Transfection was used study of primary tumors induced in newborn hamsters by simian adenovirus 7 (SA7). Infectious DNA-protein complexes were readily detected in both the supernatant and pellet fractions obtained after extraction; DEAE-dextran was required for infectivity to become manifest. Infectivity could be abolished by exposure to DNase, but it was unaffected by SA7-specific antiserum or RNase and only partially inactivated by trypsin treatment. SA7 tumor cells serially passaged in vitro or in vivo yielded infectious DNA complexes much less frequently and appeared to evolve into nonyielder cell lines. When large numbers of cells were lysed, intact virus could be recovered from all the primary tumors and from some of the subcultured lines. There was a correlation between the persistence of complete virus and the presence of infectious DNA-protein complexes. When the tumor cells carried very small amounts of intact virus, infectious DNA complexes could still be detected; when virus could no longer be detected in the tumor cells, infectious DNA complexes could no longer be found. The results suggest that a portion of the infectious DNA moieties exist as viral DNA-protein complexes in the tumor cells.

2062 SPECIFICITY OF NATURALLY OCCURRING ANTIBODY IN NORMAL GIBBON SERUM. (Eng.) Aoki, T. (Lab. Viral Carcinogenesis, Natl. Cancer Inst., Bethesda, MD 20014); Liu, M.; Walling, M. J.; Bushar, G. S.; Brandchaft, P. B.; Kawakami, T. G. *Science* 191(4232): 1180-1183; 1976.

The reactions of naturally occurring gibbon antibody with the cell surface or viral envelope antigens (or both) of various human and animal cell lines were examined by immunoelectron microscopy. Gibbon ape leukemia virus (type C) was harvested from the tissue culture of gibbon lymphosarcoma cells. Immunoelectron microscopy was performed with 3 x 10^6 target cells using ferritin-conjugated goat antibody (IgG) to human IgG and IgM. In the absorption with virus, 0.05 ml of test serum was mixed with 10^{11} gibbon ape leukemia virus particles, incubated for 45 min at 4 C, and recovered by ultracentrifugation. At least 50 cells and associated type C viruses were screened by thin section on an electron microscope. When the gibbon antibody reacted with the surface antigens of gibbon lymphosarcoma cells, all virions were labeled quite densely on the entire envelope, and 65% of the cells showed a positive reaction in small areas on the cell surface equivalent to or smaller than the diameter of a virion. The reactivity of gibbon serum was completely absorbed with purified gibbon ape leukemia virus, gibbon lymphosarcoma cells, or G-204 cells (gibbon ape leukemia virus-infected human rhabdosarcoma A-204 cells). The antibody activity was partially absorbed by normal gibbon spleen cells, dog thymus-derived cells infected with baboon endogenous type C virus, and fresh WBC obtained from a patient with chronic myelogenous leukemia in acute blastic crisis. Since these cells did not release type C virus, the findings suggest that they carried cell surface antigens common to the viral envelope antigens and that the viral genome can still express cell surface antigens common to viral envelope antigens in nonproducer cells. This postulate is supported by the poor production of putative human type C viruses and by the presence of intraviral components, reverse transcriptase, and p30 (group specific antigen), in at least some human and nonhuman primate cells. It is concluded that the cell surface antigen of certain human cells is common to the viral envelope antigen of gibbon ape leukemia virus, simian sarcoma virus, and baboon endogenous type C virus.

2063 THE METHYLATION OF ADENOVIRUS-SPECIFIC NUCLEAR AND CYTOPLASMIC RNA.

(Eng.) Sommer, S. (Rockefeller Univ., New York, NY 10021); Salditt-Georgieff, M.; Bachenheimer, S.; Darnell, J. E.; Furuichi, Y.; Morgan, M.; Shatkin, A. J. *Nucleic Acids Res* 3(3): 749-766; 1976.

The methylation pattern of adenovirus 2 (Ad2) nuclear and cytoplasmic RNA was studied in Ad2-infected HeLa cells. Each poly(A) containing cytoplasmic Ad2 mRNA contained at its 5' terminus the general structure $m^7GpppN_1pN_2p$ or $m^7GpppN_1mpN_2mpNp$, as well as an average of 4 m^6A and 0.5-1 m^5C residues per molecule. Almost all of the N_1m residues were adenine derivatives, including Am, m^6Am, and probably $m_2{}^{6,6}Am$. The N_2m was mostly Cm, but small amounts of the other three methylated bases were also present. All the methylated constituents of mRNA were distant from the 3' terminal poly(A). The amount of m^6A appeared to be greater in larger mRNA than in smaller mRNA. Nuclear Ad2 specific RNA also contained caps, m^6A, and m^5C, with about twice as much m^6A relative to caps as cytoplasmic mRNA. The similarity of Ad2 nuclear and mRNA to HeLa hnRNA and mRNA suggests that adenovirus mRNA production is a good model for eukaryotic mRNA production.

2064 THE RELATIONSHIP BETWEEN GROUP C ADENOVIRUS TUMOR ANTIGEN AND THE ADENOVIRUS SINGLE-STRAND DNA BINDING PROTEIN.

(Eng.) Levinson, A. (Princeton Univ. Dept. Biochemical Sciences, Princeton, NJ 08540); Levine, A. J.; Anderson, S.; Osborn, M.; Rosenwirth, B.; Weber, K. *Cell* 7(4): 575-584; 1976.

The single-strand specific DNA-binding protein (molecular wt 72,000 daltons) produced by group C adenoviruses soon after productive infection was studied to determine whether it was expressed in adenovirus tumors and transformed cells. Two independently derived preparations of antisera from hamsters bearing group C adenovirus tumors were tested for antibody against the single-stranded DNA-binding proteins. One antiserum contained antibodies that reacted with these DNA-binding proteins, while the second antiserum did not contain detectable levels of antibody. Five adenovirus type 2 transformed rat cell lines were tested for the presence of the single-strand specific DNA-binding proteins. Two of the five transformed cells (T_2C_4 and F-4) expressed detectable levels of this protein. These results indicate that the group C adenovirus single-strand specific DNA-binding proteins are expressed in some, but not all, adenovirus tumors and transformed cell lines. Those transformed cell lines (type 2) containing a portion of the adenovirus genome designated by the *Eco* R-I-B restriction enzyme fragment expressed the single-strand specific DNA-binding proteins, while those cell lines missing it did not contain this protein. Other experiments have located the structural gene of the single-strand specific DNA-binding protein in the *Eco* R-I-B DNA fragment, indicating that when this gene is present in a transformed cell, it is expressed.

2065 ANALYSIS OF TRANSFORMED CELL VARIANTS OF BHK21 C13 ISOLATED AS SURVIVORS OF ADENOVIRUS TYPE 5 INFECTIONS.

(Eng.) Meager, A. (Natl. Inst. Medical Res., Mill Hill, London NW7 1AA, England); Nairn, R.; Hughes, R. C. *Virology* 68(1): 41-57; 1975.

The transformed cell variants of the baby hamster kidney cell line, BHK21 C13, selected as survivors after sequential lytic infections with adenovirus type 5 (Ad5) and carrying Ad5-linked tumor-specific antigens, were examined for several properties. These included the ability of clones to grow in 0.5% fetal bovine serum (FBS) and in agar suspension, sialic acid content, and agglutinability induced by concanavalin A. Lactoperoxidase-catalyzed cell surface labeling was also used to compare the cell variants with normal BHK21 C13 cells and a clone of BHK21 C13 cells transformed by polyoma virus. Considerable variation of cellular properties was observed among the several variant clones examined. Clones isolated from survivors of Ad5 infection grown in medium containing 2.1 mM calcium were large polyploid cells exhibiting density-dependent inhibition of growth, yet able to grow in 0.5% FBS and agar suspension. However, clones of small round cells, morphologically resembling adenovirus transformants of hamster cells, isolated from survivors of Ad5 infection, grown in medium containing 0.3 mM calcium, lacked density-dependent inhibition of growth. All but one of the clones tested exhibited increased agglutinability with concanavalin A. The properties examined could vary independently among different clones of variant cells.

2066 SPONTANEOUS INTERFERON PRODUCTION AND EPSTEIN-BARR VIRUS ANTIGEN EXPRESSION IN TWO HUMAN LYMPHOID CELL LINES AND THEIR SOMATIC CELL HYBRIDS.

(Eng.) Lidin, B. (Dept. Surgery, Univ. Alabama in Birmingham, Birmingham, AL 35294); Adams, A. *Intervirology* 5(3/4): 205-215; 1975.

Two human lymphoid cell lines, Raji and Namalwa, and seven somatic cell hybrids between these two cells were tested for spontaneous interferon production. Namalwa and three of the hybrids produced interferon, while the four other hybrids and Raji did not. Although the Namalwa line is relatively resistant to superinfection with the Epstein-Barr virus (EBV), all hybrids are as susceptible to EBV as the Raji parent. High extracellular concentrations of interferon likewise had little effect on EBV superinfection of Raji or the hybrid cells. Raji may produce some factor that antagonizes the action of interferon to allow virus expression.

2067 LATENT GENOMES OF EPSTEIN-BARR VIRUS.

(Eng.) Tanaka, A.; Nonoyama, M. In: *Oncogenesis and Herpesvirus II. Part 1: Biochemistry of Viral Replication and In Vitro Transformation. Proceedings of a Symposium held in Nuremberg, Federal Republic of Germany, 14-16 October 1974.* International Agency for Res. on Cancer. (Lyon, France): pp. 133-137; 1975.

Of the Epstein-Barr virus DNAs in Raji cells that contained 50 to 60 viral genomes per cell, 90% were separated from high molecular weight cellular DNA by centrifugation. It was performed in a neutral glycerol gradient after the cells were lysed by treatment with pronase and Sarkosyl, indicating that the major portion of the EBV DNA in Raji cells was not integrated linearly into cellular DNA.

2068 RESPONSE OF MARMOSETS TO EXPERIMENTAL INFECTION WITH EPSTEIN-BARR VIRUS.

(Eng.) Deinhardt, F.; Falk, L.; Wolfe, L. G.; Paciga, J.; Johnson, D. In: *Oncogenesis and Herpesvirus II. Part 2: Epidemiology, Host Response and Control. Proceedings of a Symposium held in Nuremberg, Federal Republic of Germany, 14-16 October 1974.* International Agency for Res. on Cancer. (Lyon, France): pp. 161-168; 1975.

The response of cotton-topped (CT) or white-lipped (WL) marmosets to inoculated material containing Epstein-Barr virus (EBV) was studied. Twenty-five marmosets inoculated with 10^6-10^8 cells from human or simian EBV-carrying lymphoblastoid cell cultures developed no detectable clinical disease. Transitory antibody titers to viral capsid antigen were detected in the sera from several. Thirty-eight marmosets inoculated with P3 virus (10^9 particles) and seven marmosets inoculated with 10^5 infectious units of HR-1 virus likewise developed no recognizable clinical or hematological disease over several years of observation. Five of 11 animals inoculated with 10^3-10^4 transforming units of EBV strain B95-8 developed malignant lymphoma and died 31-110 days postinfection. Antibodies to one or more EBV-specified antigens were detected in the sera from nine of the inoculated marmosets. EBV-carrying lymphoblastoid cell cultures were established from the spleen and lymph nodes of one animal that died with malignant lymphoma and from another animal that died 19 days postinfection from undetermined causes.

2069 EPSTEIN BARR VIRUS AND NASOPHARYNGEAL CARCINOMA (Letter to Editor). (Eng.)

Trumper, P. A. (Univ. Bristol Medical Sch., Bristol BS8 1TD, England); Epstein, M. A.; Giovanella, B. C. *Lancet* 1(7961): 686-687; 1976.

Nasopharyngeal carcinoma from a secondary lymph-node deposit was passed sc to nude mice and then cultured. Cultures from four separate tumors were treated with 5-bromo-2'-deoxyuridine (BUdR). These cultures had both typical immature hexagonal herpesvirus particles with either ring-shaped or central dense nucleoids and less abundant mature enveloped virus; the control cultures were free of herpes particles. It is concluded that BUdR treatment can activate productive Epstein-Barr virus (EBV). Whether or not the activated virus is fully infectious has not been determined; its presence in malignant epithelial cells is the first example of EBV replication in a cell other than a primate B lymphocyte. The squamous epithelium of the post-nasal space may thus be the site of infectious particle production.

2070 ALTERATION IN EPSTEIN-BARR VIRUS-HUMAN LYMPHOID CELL INTERACTIONS CAUSED BY THE PRESENCE OF TYPE-C VIRAL GENOME.

(Eng.) Osato, T.; Mizuno, F.; Yamamoto, K.; Nonoyama, K. In: *Oncogenesis and Herpesvirus II. Part 2: Epidemiology, Host Response and Control. Proceedings of a Symposium held in Nuremberg, Federal Republic of Germany, 14-16 October 1974.* International Agency for Res. on Cancer. (Lyon, France): pp. 27-35; 1975.

A cell line (FVNC) was established by infecting Epstein-Barr virus (EBV)-productive human lymphoid NC-37 cells with type C Friend murine leukemia virus. The FVNC cell line has been maintained free of detectable EBV- and FLV-related immunofluorescent antigens for 3 yr, despite the existence of both viral genomes in a repressed form. The cells were morphologically similar to uninfected NC-37 cells but there was a consistent D-group chromosome change. The colony-forming capacity of FVNC cells in semisolid agar medium was about 1/10 of that of NC-37, although the former grew faster than the latter in fluid culture. FVNC cells were three times more sensitive to EBV superinfection than NC-37, as shown by immunofluorescence. In addition, an obvious induction of FLV antigenic markers occurred in FVNC cells on exposure to EBV. Nucleic acid hybridization experiments showed a striking decrease in the number of EBV genomes in FVNC cells, but Epstein-Barr nuclear antigen was clearly present in all FVNC cells as well as in NC-37 cells.

2071 ACTIVATION IN VITRO BY BUDR OF A PRODUCTIVE EB VIRUS INFECTION IN THE EPITHELIAL CELLS OF NASOPHARYNGEAL CARCINOMA.

(Eng.) Trumper, P. A. (Univ. Bristol Medical Sch., Univ. Walk, Bristol BS8 1TD, England); Epstein, M. A.; Giovanella, B. C. *Int J Cancer* 17(5): 578-587; 1976.

Epithelial cells from human nasopharyngeal carcinoma (NCP) were passaged in athymic (nude) mice to eliminate nonmalignant infiltrating cells. The human origin and derivation from NPC malignant epithelial cells of the nude mouse tumors were confirmed by chromosome examination, electron microscopy showing desmosomes and keratin fibrils, and positive Epstein-Barr (EB) virus nuclear antigen (EBNA) testing. Samples of the mouse-grown tumors were cultured and pure monolayers of epithelial cells were obtained that still expressed EBNA and contained desmosomes and keratin; these cultures grew well for about 3 wk. Extensive electron microscope searches did not reveal herpes virus particles. In contrast, cultures treated with bromoxydeuridine showed typical immature and mature herpesvirus particles in epithelial, keratin-containing cells; immunofluorescence tests for virus capsid antigen with a battery of human sera identified these particles as EB virus. EB virus was thus activated in NPC epithelial cells and was capable of replication in a cell type other than a primate B lymphocyte.

2072 NUCLEIC ACID BIOSYNTHESIS IN NUCLEI OF CELLS INFECTED WITH HERPESVIRUS (HSV AND EBV). (Eng.) Becker, Y.; Ben-Zeev, A.; Kamincik, Y.; Asher, Y.; Shlomai, J. In: *Oncogenesis and Herpesvirus II. Part 1: Biochemistry of Viral Replication and In Vitro Transformation. Proceedings of a Symposium held in Nuremberg, Federal Republic of Germany, 14-16 October 1974.* International Agency for Res. on Cancer. (Lyon, France): pp. 245-257; 1975.

Analysis of nuclei isolated from herpes simplex virus (HSV)-infected cells by electrophoresis in polyacrylamide gels showed that only virion-associated DNA molecules migrated into the gels. Centrifugation of deoxycholate-treated infected nuclei in sucrose gradients revealed that most of the viral DNA cosedimented with the cellular DNA. The DNA-dependent RNA polymerase activity also cosedimented with the viral and cellular DNA. When nuclei isolated from HSV-infected cells were incubated under in vitro conditions that support DNA synthesis, viral molecules of low molecular weight were synthesized; nuclei from Burkitt lymphoblasts did not synthesize DNA. The nature of the association between cellular DNA and EBV DNA was studied by hybridization experiments with EBV cRNA. EBV-specific sequences were found in the lymphoblast DNA; they banded at a density of 1.707 g/cm^3. Most of the RNA synthesized in HSV-infected nuclei could be released after incubation of the nuclei in vitro in the presence of ATP. The released RNA consisted of poly(A)-plus and poly(A)-minus molecules.

2073 MUTANT OF HERPES SIMPLEX VIRUS TYPE 1 CONDITIONALLY ABLE TO TRANSFORM THYMIDINE KINASELESS L CELLS TO A TK+ PHENOTYPE. (Eng.) Hughes, R. G., Jr. (Dept. Medical Viral Oncology, Roswell Park Memorial Inst., Buffalo, NY 14263); Munyon, W. H. *J Virol* 18(3): 867-872; 1976.

After nitrous acid mutagenesis of herpes simplex virus type 1 (HSV-1), a mutant, 1093, was isolated that, during productive infection, induced very low levels of thymidine kinase (tk). The mutation was either a missense or a defect in a control element. After UV irradiation the mutant virus was unable to transform L cells lacking tk (Ltk-) to a tk+ phenotype, as characterized by growth of the cells in a modified HAT-selective medium containing 1.6 x 10^{-5} M thymidine. Cells transformed by wild-type virus grew vigorously under the same conditions. In 10^{-3} thymidine medium, the mutant transformed Ltk- cells that maintained their conditional character and would not grow in low concentrations of thymidine in selective medium. This mutant was thus conditional on the thymidine concentration in the selection medium in its ability to transform Ltk- cells to a tk+ phenotype. The conditionally transformed cells were supertransformable with wild-type UV-irradiated HSV-1 to a phenotype that grew in low-thymidine selective medium. The frequency of supertransformation closely approximated the frequency of transformation of Ltk- cells by wild-type virus. Supertransformation at high frequency was effected by mutant 1093 or the tk- mutant B2006. These results indicate that the presence of HSV-1 genetic information in HSV-1-transformed cells does not preclude the acquisition by these cells of at least one additional HSV-1 gene, that for tk.

2074 HERPES SIMPLEX VIRUS PROTEINS: DNA-BINDING PROTEINS IN INFECTED CELLS AND IN THE VIRUS STRUCTURE. (Eng.) Bayliss, G. J. (M.R.C. Virology Unit, Univ. Glasgow, Glasgow G11 5JR, Scotland); Marsden, H. S.; Hay, J. *Virology* 68(1): 124-134; 1975.

The DNA-binding proteins were isolated from BHK21/C13 cells infected with herpes simplex virus type 1 strain 17 syn+ (by native and denatured DNA affinity chromatography). Sixteen proteins were identified as specific to the infected cell on SDS polyacrylamide gradient gel electrophoresis, their molecular wt ranged from 145 x 10^3 to 10.5 x 10^3. After infection with herpes simplex virus, many of the mock infected cell specific DNA binding proteins were no longer produced; this ''switch off'' of host cell protein synthesis was rapid. The virus-induced DNA-binding proteins fell into two quantitative classes; there was evident for temporal control of their synthesis. One of the virus-induced DNA-binding proteins had a molecualr wt identical to a polypeptide found in full but not empty particles, another bound preferentially to denatured DNA.

2075 PRELIMINARY BIOCHEMICAL CHARACTERIZATION OF THE FACTOR(S) RESPONSIBLE FOR HERPESVIRUS-INDUCED EXOGENOUS FUSION. (Eng.) Levitan, D. B. (Univ. Pennsylvania Sch. Medicine, Philadelphia, PA 19104); Blough, H. A. *J Virol* 18(3): 1081-1087; 1976.

To develop an in vitro system for producing exogenous fusion by herpes simplex virus (HSV) comparable to paramyxovirus-induced exogenous fusion, and to investigate the biological and biochemical arameters of this phenomenon, BHK-21 cell cultures ere infected with HSV-1. Cell-free extracts prepared from the BHK-21 cells rapidly induced exognous fusion when incubated with indicator monolayers f uninfected BHK-21 cells. Fusion was first observed t 1 hr and peak activity was reached by 4 hr. Dialent cations were required for activity. Inhibition f indicator cell macromolecular synthesis with metaolic inhibitors did not prevent formation of cell-ree extract-induced polykaryocytes. Removal of virus articles from the cell-free extract by velocity sedmentation centrifugation did not affect cell-free xtract exogenous fusion activity. Studies using molecular probes, namely, glycosidases, lectins, and antierum (directed against either HSV envelope or apsid proteins), suggest that the factor(s) resonsible for herpesvirus fusion is a fucosylated lycoprotein that is not a structural component of he virion.

2076 IN VIVO CHARACTERISTICS OF TEMPERATURE-SENSITIVE HOST RANGE MUTANTS OF HERPES IMPLEX VIRUS TYPE 2.

(Eng.) Koment, R. W. (Univ. iami Sch. Medicine, PO Box 875, Biscayne Annex, iami, FL 33152); Rapp, F. *Intervirology* 5(1/2): 0-20; 1975.

he in vivo properties of four host range temperature-sensitive (ts) mutants of herpes simplex irus type 2 (HSV-2) were correlated with known in itro characteristics. Mutants and parental virus ere inoculated into newborn and weanling Swiss ice and weanling golden Syrian hamsters by the ntracranial and sc routes, and into weanling New ealand rabbits by corneal scarification. In all ases, the pattern of attenuation of mutants in ivo correlated with their stability in vitro at 39 C. The most attenuated mutant (mutant 69) was lso the most consistent in its inability to induce cytopathic effects in vitro or to replicate nder nonpermissive conditions. Conversely, the ost virulent mutant (mutant 41) was the least table under nonpermissive conditions.

2077 INTERTYPIC COMPLEMENTATION AND RECOMBINATION BETWEEN TEMPERATURE-SENSITIVE MUTANTS OF HERPES SIMPLEX VIRUS TYPES 1 AND 2.

(Eng.) Esparza, J. (Departamenta de Virologia, Instituto Venezolano de Investigaciones Cientificas, Caracas, Venezuela); Benyesh-Melnick, M.; Schaffer, P. A. *Virology* 70(2): 372-384; 1976.

Intertypic complementation and recombination experiments between temperature-sensitive mutants (ts) of herpes simplex virus 1 (HSV-1) and 2 (HSV-2) were performed to identify functionally ''common'' and ''type-specific'' genes in the virus genomes. Intertypic complementation was performed with seven HSV-1 ts mutants and eight HSV-2 ts mutants representing five complementation groups each. Efficient complementation was detected with most HSV-1 + HSV-2 ts mutant pairs, indicating extensive interchangeability of gene functions between HSV types 1 and 2. Complementation was symmetric in that equal amounts of both HSV-1 and HSV-2 ts mutants were produced. HSV-1 wild-type virus also efficiently complemented HSV-2 ts mutants. Intertypic recombination experiments demonstrated that heterologous mutant pairs which failed to complement also failed to recombine efficiently. The lack of complementation possibly resulted from interactions involving genes with regulatory functions. Mutants possessing multiple defects may have been included in the tests and so accounted for the lack of complementation. It is unlikely that this lack is entirely due to the presence of similar functional defects in both mutants.

2078 RNA SYNTHESIS IN CELLS INFECTED WITH HERPES SIMPLEX VIRUS. XII. SEQUENCE COMPLEXITY AND PROPERTIES OF RNA DIFFERING IN EXTENT OF ADENYLATION.

(Eng.) Silvertein, S. (Coll. Physicians and Surgeons, Columbia Univ., New York, NY 10032). Millette, R.; Jones, P.; Roizman, B. *J Virol* 18(3): 977-991; 1976.

Fractionation of polyadenylated RNA from human epidermoid carcinoma No. 2 cells infected with herpes simplex virus by affinity chromatography on columns of poly(U)immobilized on glassfiber filters yielded three major classes of RNA-containing poly(A) chains with average lengths of 30, 50, and 155 adenylate residues [poly(A)$_{30}$, poly(A)$_{50}$, poly(A)$_{155}$]. In contrast, nitrocellulose membranes bound predominantly a fraction of RNA containing poly(A)$_{155}$. The distribution of cytoplasmic RNA in the three classes was independent of the labeling interval, which ranged from 10 min to 6 hr. Cytoplasmic poly(A) RNA consisted mainly (57% to 68%) of the poly(A)$_{155}$ class; this was also the major class (68%) of polyadenylated RNA found in polyribosomes. Nuclear poly(A) RNA consisted largely (42% to 50%) of poly(A)$_{30}$ class, whereas high-molecular-weight nuclear RNA sedimenting at >45 S contained almost exclusively the poly(A)$_{30}$ tracts. Hybridization experiments involving unlabeled RNA and labeled viral DNA revealed the presence of viral RNA sequences complementary to approximately 40% of viral DNA in all polyadenylated RNA classes. Since unfractionated cytoplasmic RNA arises from approximately 40% of the viral DNA, it is concluded that most, if not all, viral RNA species in the cytoplasm were adenylated. In contrast to these results, only a fraction of poly(A)$_{155}$ RNA, complementary to 21% of viral DNA, bound to nitrocellulose filters. Because transcripts homologous to 40% of viral DNA bind to nitrocellulose membranes, the selective binding of poly(A)$_{155}$ sequences to nitrocellulose filters might be related to its secondary structure, provided the RNA is denatured prior to filtration. The data suggest that poly(A) tracts arise by at least two separate steps. The first involves the appearance of poly(A)$_{30}$ tracts in the high-molecular-weight nuclear transcripts. The second involves polyadenylation to poly(A)$_{50}$ and poly(A)$_{155}$ RNA classes concomitant with processing and transport to the cytoplasm.

2079 PARTIAL PURIFICATION AND BIOCHEMICAL CHARACTERIZATION OF HERPESVIRUS SAIMIRI.

(Eng.) Aaslestad, H. G.; Twardzik, D. R.; Arm-

[illegible], Leve, V.; Ablashi, D. V. In: *Oncogenesis and Herpesvirus II. Part 1: Biochemistry of Viral Replication and In Vitro Transformation. Proceedings of a Symposium held in Nuremberg, Federal Republic of Germany 14-16 October 1974.* International Agency for Res. on Cancer. (Lyon, France): pp. 269-275; 1975.

Herpesvirus saimiri (HVS) propagated in Vero cells was labeled with ^{3}H-leucine and purified by isopycnic flotation in sucrose. Electron microscopy revealed both complete and incomplete HVS. There was no significant contamination with cellular debris. Polyacrylamide gel electrophoresis analysis of solubilized virus revealed at least 12 proteins, varying in molecular wt from 8000 to 200,000 daltons.

2080 TRANSFORMATION IN VITRO WITH HERPESVIRUS ATELES. (Eng.) Falk, L.; Wolfe, L.; Deinhardt, F. In: *Oncogenesis and Herpesvirus II. Part 1: Biochemistry of Viral Replication and In Vitro Transformation. Proceedings of a Symposium held in Nuremberg, Federal Republic of Germany, 14-16 October 1974.* International Agency for Res. on Cancer. (Lyon, France): pp. 379-383; 1975.

Continuous lymphoblastoid cell cultures were established after transformation in vitro with herpesvirus ateles (HVA) of marmoset splenic or circulating lymphocytes. Transformation was achieved by cocultivating lymphocytes with lethally x-irradiated, HVA-carrying marmoset tumor cells or by infecting marmoset lymphocytes with cell-free virus. Twenty-eight continuous cultures from 39 that underwent cocultivation and 2 of 4 lymphocyte preparations infected with virus became transformed. Cultivation periods before transformation were in the range 17-32 days (cocultivation) or 51-53 days (cell-free virus). HVA genome expression in transformed cultures was demonstrated by: recovery of small amounts of HVA from culture fluids; ability of lymphoblasts to induce infectious centers after cocultivation with permissive cells; and observation of antigen-positive cells after staining with monospecific antiserum. Most cultures were composed of T lymphocytes: cells of 16 of 24 cultures formed rosettes with SRBC and none of 30 possessed membrane immunoglobulin.

2081 ANTI-E IN PRIMARY HEPATIC CARCINOMA (Letter to Editor). (Eng.) Werner, B. G. (Fox Chase Cancer Center, Philadelphia, PA 19111); Burphy, B. L.; Maynard, J. E.; Larouze, B. *Lancet* 1(7961): 696; 1976.

The sera from 85 patients with primary hepatic carcinoma (PHC), 42 patients with chronic liver disease, and 121 matched controls were assayed for e and anti-e antigens by rheophoresis. The sera were collected in Mali and Senegal. Persistence of e was associated with chronic active liver disease, and anti-e was associated with asymptomatic carriage of hepatitis B surface antigen (HBsAg). Approximately a third of both the PHC and control sera positive for HBsAg showed anti-e activity in two groups; neither e nor anti-e activity was detected in a third group. None of the sera negative for HBsAg had either e or anti-e. The PHC patients, of whom about 75% also had cirrhosis, showed an anti-e frequency like that of the control HBsAg carriers. The relationship of hepatitis B infection to PHC is unclear, but if e antigen is related to active replication of the entire virus, the process may no longer be occurring in PHC patients. Because seroconversion to anti-e can occur in the presence of liver disease, caution should be observed in equating the presence of anti-e with no or slight liver disorder.

2082 DECAPSIDATION OF POLYOMA VIRUS: IDENTIFICATION OF SUBVIRAL SPECIES. (Eng.) Frost, E. (Departement de Microbiologie, Centre Hospitalier Universitaire, Universite de Sherbrooke, Sherbrooke, Quebec, Canada J1H 5N4); Bourgaux, P. *Virology* 68(1): 245-255; 1975.

Mouse embryo cells exposed to polyoma virus (labeled in its protein and/or DNA moiety) were fractionated at various times after infection. Sedimentation analysis of the cytoplasm in 1 M NaCl solution revealed the presence of a labeled viral DNA-protein complex (NP) that was absent from virus preparations used for infection. This complex had a sedimentation coefficient of approximately 135 S and a DNA/protein ratio higher than that of virus. Another species, a DNA-free complex (DFC) sedimenting at about 185 S, was identified in the cytoplasm. It contained reduced amounts of histone-like polypeptides and little or no DNA, compared with virus. Unlike the material sedimenting like ''full'' virus particles that was also found in the cytoplasm, neither NP or DFC was stable in 2.7 M CsCl. Histone-like polypeptides lost from the above-mentioned species were detected in the cytoplasm as slowly sedimenting material. Radioactive material sedimenting as free DNA in 1 M NaCl solution was recovered from the nucleus and, occasionally, from the cytoplasm. The viral DNA in the nucleus was thought to be instrumental in directing the infectious process.

2083 STUDIES ON NON-TRANSFORMING HOST RANGE MUTANTS OF POLYOMA VIRUS. (Eng.) Benjamin, T. L.; Norkin, L.; Goldman, E. In: *Tumor Virus-Host Cell Interaction.* Edited by A. Kolber. (New York: Plenum Press): pp. 141-147; 1975.

The isolation and partial characterization of two kinds of conditional lethal mutants of polyoma virus are reviewed, and experiments on the ability of the nontransforming host range mutant, NG-18, to induce abortive transformation in a continuous line of rat embryo cells are reported. Mutants of the first or initiation class can carry out abortive transformation, stimulate cellular DNA synthesis, and cause agglutinability at the nonpermissive temperature. Mutants of the second or maintenance class uniformly fail to induce agglutinability but show variable responses in inducing cellular DNA synthesis. In experiments with NG-18, normal rat embryo cells were arrested in G_1, infected by wild-type polyoma virus or NG-18, and incubated for 48 hr in serum-free edium containing 2 μCi/ml ^{3}H-thymidine. The number f cells synthesizing DNA was determined by autoradi- graphy. The wild-type virus was 10 times more ffective than NG-18 in inducing cellular DNA syn- hesis and was able to induce abortive transformation, hile NG-18 was not. Both were equally effective in nducing the polyoma-specific tumor antigen in erum-starved rat cells. The inability of NG-18 to ause abortive transformation was related to failure o induce cellular DNA synthesis and to bring about he cell surface change from the nonagglutinable to he agglutinable state, which had been shown to epend on cellular DNA synthesis. The relationship etween agglutinability and permissivity was tested irectly by isolating phenotypic revertants of ermissive polyoma-transformed 3T3 cells that had egained normal growth properties. In all three evertants tested for agglutinability by concanavalin and permissivity for wild-type and NG-18 viruses, he membrane was restored to the agglutinable level haracteristic of normal 3T3 cells, while the cells emained largely permissive. It is concluded that oth the agglutinable state and the permissive unction are expressions of cellular genetic information capable of being triggered by different trans- orming viruses and that several steps must be nvolved between the expression of cell-associated iral genes and the cell surface change.

084 REPLICATION OF POLYOMA DNA: EFFECTS OF HYDROXYUREA AND ARABINOSYL CYTOSINE.

Eng.) Magnusson, G.; Craig, R.; Narkhammar, M.; eichard, P.; Staub, M.; Warner, H. In: *Tumor iruses. Cold Spring Harbor Symposia on Quantita- ive Biology.* Cold Spring Harbor Laboratory (Cold pring Harbor, NY): Vol. 39, pp. 227-233; 1975.

he inhibition of DNA replication in polyoma virus- nfected 3T6 cells by hydroxyurea and 1-β-D-arabino- uranosylcytosine (araC) was studied. When infected ells were treated with hydroxyurea and incubated ith ^{3}H-thymidine, the majority of the label was ecovered in very short segments of DNA; however, 0% of the label was recovered as very early rep- icative intermediates (RI). Various analyses were sed to characterize these RI, and the results uggest that hydroxyurea inhibits their accumulaion. ^{3}H-araC treatment of infected cells leads to ncorporation of label into the internucleotide inkages of DNA. Pulse label studies suggested hat araC inhibits general chain elongation and he growth of Okazaki fragments. The present con- ept of viral DNA replication in infected cells nd possible explanations of the effects of the wo inhibitors are described.

085 INVESTIGATIONS OF THE POSSIBLE ROLE OF PROTEASES IN ALTERING SURFACE PROTEINS F VIRALLY TRANSFORMED HAMSTER FIBROBLASTS.

(Eng.) ynes, R. O. (Center for Cancer Res., Massachusetts nst. Technology, Cambridge, MA 02139); Pearlstein, . S. *J Supramol Struct* 4(1): 1(1)-14(14); 1976.

hen prelabeled normal fibroblasts are cocultivated ith hamster sarcoma or polyoma virus transformed ells, the large external transformation-sensitive (LETS) glycoprotein of the normal cells shows an increased rate of turnover. Experiments were carried out to investigate the possibility that this phenomenon and the absence of LETS glycoprotein are due to proteolysis by the transformed cells. The role of plasminogen activation was examined by the use of protease inhibitors and plasminogen-depleted serum. Activation of plasminogen was not required for the disappearance of the LETS glycoprotein, although the involvement of other proteases could not be ruled out. The role of proteases in affecting cell growth and behavior is discussed.

2086 PURIFICATION OF DEFECTIVE INTERFERING T PARTICLES OF VESICULAR STOMATITIS AND RABIES VIRUSES GENERATED IN VIVO IN BRAINS OF NEWBORN MICE.

(Eng.) Holland, J. J. (Dept. Biology, Univ. California San Diego, La Jolla, CA 92037); Villarreal, L. P. *Virology* 67(2): 438-449; 1975.

Compared to adult mice, newborn mice generated defective interfering T particles after two high-multiplicity passages of cloned VSV B virions inoculated ic. After three or four serial ic passages, massive production of T particles were observed, and mg quantities of B virions and T particles were purified directly from the brains of several litters of newborns. These purified brain T particles were shown to interfere strongly with B virions in vitro, replicate true in vivo and in vitro, contain small discrete subgenomic fragments of viral RNA, and lack the ability to transcribe full-size viral messenger RNA molecules in in vitro transcriptase reactions. Rabies B virions generated large amounts of T particles during first passage in newborn mouse brains. Defective interfering particles were not an artifact of in vitro and in ovo conditions.

2087 IN VITRO SYNTHESIS OF A-PARTICLE STRUCTURAL PROTEIN BY MEMBRANE-BOUND POLYRIBOSOMES.

(Eng.) Lueders, K. K. (Lab. Biochemistry, Natl. Cancer Inst., Bethesda, MD 20014). *J Virol* 18(3): 1088-1094; 1976.

In the attempt to learn about the site of synthesis of intracisternal A-particle polyribosomes from mouse myeloma MOPC-194E, a tissue containing numerous A particles, were dissociated from the cells. On the basis of association with endoplasmic reticulum membranes, the polyribosomes were classified as membrane-bound or free. These were then compared for their capacity to incorporate [^{35}S]methionine into A-particle proteins in vitro. As revealed by radioimmunological assay, more labeling of A-particle protein occurred with the membrane-bound polyribosomes than with the free polyribosomes (40-65 and 25-50 pmol/mg protein/10 min). Peptide mapping of the immunoprecipitated, in vitro [^{35}S]-methionine-labeled product confirmed that A-particle protein was synthesized in vitro.

2088 CELLULAR CONTROL OF THE TICK-BORNE VIRUS ANTIGEN PRODUCTION IN PERSISTENTLY INFECTED CELL CULTURE.

(Eng.) Boriskin, Yu. S. (Moscow Inst. Viral Preparations, 1st Dubrovskaya St., 15 Moscow, 109088, U.S.S.R.); Bogomolova, N. N. *Experientia* 32(3): 322-324; 1976.

The influence of inhibition or stimulation of cellular DNA synthesis on tick-borne virus antigen production in persistently infected cell culture was studied. Either mitomycin C or cytosine-arabinoside stopped the increase in antigen-containing cells. Stimulation of cellular DNA synthesis by growth medium change increased the level of antigen-containing cells. When HEp-2-Sof culture was synchronized, a correlation was observed between the entrance of cells into DNA synthesis phase and an increase in the proportion of antigen-containing cells. This indicates that cell cycle activities may operate in tick-borne virus antigen production during the growth of persistently infected HEp-2-Sof cells.

2089 HETEROGENEITY OF SURFACE ANTIGENS ON ENDOGENOUS TYPE C VIRUS-PRODUCING CELL SUBLINES DERIVED FROM A CLONAL LINE OF BALB/3T3 CELLS. (Eng.) Aoki, T. (Natl. Cancer Inst., Natl. Insts. Health, Bethesda MD 20014); Herberman, R. B.; Liu, M. *Intervirology* 5(1/2): 31-42; 1975.

Four cell surface antigens (PC1, X.1, GCSA, and MEV-SA1) and three viral envelope antigens (xVEA, x1-VEA, and sub-gsVEA) were used as markers of virus populations in various sublines of the BALB/c embryonic fibroblast BALB/3T3 clone A31 line. Of four spontaneously transformed sublines, two released N-tropic endogenous type C viruses spontaneously after long-term culture and each had distinct antigenic patterns. Treatment with 5-bromodeoxyuridine (BrdU) resulted in the detection of X-tropic viruses in all four sublines. The expression of the X-tropic viruses was associated with two different antigenic patterns. When the clonal rabbit corneal SIRC cell line was infected with the X-tropic viruses obtained after BrdU treatment, the cells acquired detectable amounts of only one of the antigenic markers. The results emphasize the complexity and heterogeneity of cell surface antigens associated with endogenous viruses, even in sublines derived from the same cloned cell line.

2090 AN ANTIGENICALLY RELATED TRYPTIC POLYPEPTIDE FROM SEVERAL MAMMALIAN TYPE C RNA VIRUS P30S. (Eng.) Davis, J. (Flow Labs., Inc., PO Box 2226, 1710 Chapman Ave., Rockville, MD 20852); Gilden, R. V.; Oroszlan, S. *Intervirology* 5(1/2): 21-30; 1975.

Limited tryptic digestion of p30 antigen (the major internal viral protein) of hamster, rat, and gibbon ape type C viruses yielded a polypeptide fragment with a molecular wt of approximately 10,000 daltons. Some antigenic determinants with interspecies specificity were retained on these polypeptides, which cross-reacted with antibody produced previously against a similar fragment obtained from mouse p30. Exhaustive trypsinization resulted in further fragmentation with concomitant loss of serologic activity. The results suggest that all mammalian type C virus p30s have an antigenically related polypeptide core that is not readily digested by trypsin.

2091 INFECTIOUS PROVIRAL DNA IN HUMAN CELLS INFECTED WITH TRANSFORMATION-DEFECTIVE TYPE C VIRUSES. (Eng.) Nicolson, M. O. (Childrens Hosp. Los Angeles, P.O. Box 54700, Terminal Annex, Los Angeles, CA 90054); Hariri, G.; Krempin, H. M.; McAllister, R. M.; Gilden, R. V. *Virology* 70(2): 301-312; 1976.

Human rhabdomyosarcoma cells (RD) were infected with the transformation-defective feline virus, RD-114, and were seen to contain viral-specific DNA integrated into the chromosomal DNA that specifies complete information for progeny virus formation. This cellular DNA is infectious for permissive cells of human and canine origin, and gives rise to progeny virus identical in assessed biochemical and biological properties to the parental virus. The host range for transfection with RD-114 DNA was similar to that of the intact virus. Although progeny virus were only first detected by reverse transcriptase assay at 2-4 wk after transfection, virus is actually released at 3 days post-transfection. The minimum dose of RD-114 DNA required for one infectious event in 2 x 10^6 RD cells was 0.10 to 0.20 μg. The calculated efficiency of infection of 1 infectious unit was 5 x 10^4 to 5 x 10^5 viral gene copies, if there were 2 or 20 copies per infected cells, respectively. Approximately one in every 10^4 RD-114 treated cells was initially replicating progeny virus. RD cells, productively infected with the transformation-defective mammalian viruses FeLV and GaLV, also contained viral-specific DNA, which gave rise to the respective virus of origin upon application to permissive RD cells.

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2093 LONG-TERM PRESERVATION OF TRANSFECTING ACTIVITY OF DNA ISOLATED FROM RAT VIROGENIC XC CELLS TRANSFORMED BY PRAGUE STRAIN OF ROUS SARCOMA VIRUS. (Eng.) Stetina, R. (Inst. Experimental Biology and Genetics, Czechoslovak Acad. Sciences, Praha 6, Czechoslovakia); Svoboda, J.; Mach, O. *Folia Biol (Praha)* 21(5): 334-339; 1975.

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2141 TERMINAL REPETITIONS IN HERPES SIMPLEX VIRUS TYPE 1 DNA. (Eng.) Grafstrom, R. H.; Alwine, J. C.; Steinhart, W. L.; Hill, C. W. In: *Tumor Viruses. Cold Spring Harbor Symposia on Quantitative Biology.* Cold Spring Harbor Lab. (Cold Spring Harbor, NY): vol. 39, pp. 679-681; 1975.

2142 QUANTITATIVE TRANSFORMATION OF SWISS/3T3 CELLS BY UV-IRRADIATED HERPES SIMPLEX TYPE 2. (Eng.) Duff, R. In: *Oncogenesis and Herpesviruses II. Part 1: Biochemistry of Viral Replication and In Vitro Transformation. Proceedings of a Symposium held in Nuremburg, Federal Republic of Germany, 14-16 October 1974.* International Agency for Res. on Cancer. (Lyon, France): pp. 421-427; 1975.

2143 CHROMOSOME CHANGES IN HAMSTER CELL LINE EXPOSED TO HERPES SIMPLEX VIRUS TYPE 2. (Eng.) Macek, M.; Kutinova, L.; Vonka, V.; Jenik, S. In: *Oncogenesis and Herpesviruses II. Part 1: Biochemistry of Viral Replication and In Vitro Transformation. Proceedings of a Symposium held in Nuremburg, Federal Republic of Germany, 14-16 October 1974.* International Agency for Res. on Cancer. (Lyon, France): pp. 285-288; 1975.

2144 TRANSFORMATION OF MOUSE CELLS WITH HERPES-SIMPLEX VIRUS TYPE 2. (Eng.) Boyd. A.; Orme, T.; Boone, C. In: *Oncogenesis and Herpesvirus II. Part 1: Biochemistry of Viral Replication and In Vitro Transformation. Proceedings of a Symposium held in Nuremberg, Federal Republic of Germany, 14-16 October 1974.* International Agency for Res. on Cancer. (Lyon, France): pp. 429-435; 1975.

2145 SERO-IMMUNOLOGICAL INVESTIGATIONS IN PATIENTS WITH CERVICAL CANCER: HIGHER RATE OF HSV-2 ANTIBODIES THAN IN SYPHILIS PATIENTS AND EVIDENCE OF IgM ANTIBODIES TO AN EARLY HSV-2 ANTIGEN. (Eng.) Schneweis, K. E.; Haag, A.; Lehmkoster, A.; Koenig, U. In: *Oncogenesis and Herpesviruses II. Part 2: Epidemiology, Host Response and Control. Proceedings of a Symposium held in Nuremburg, Federal Republic of Germany, 14-16 October 1974.* International Agency for Res. on Cancer. (Lyon, France): pp. 53-57; 1975.

2146 HERPESVIRUS TYPE 2-INDUCED TUMOUR-SPECIFIC ANTIGEN (AG-4) AND SPECIFIC ANTIBODY IN PATIENTS WITH CERVICAL CANCER AND CONTROLS. (Eng.) Aurelian, L.; Cornish, J. D.; Smith, M. F. In: *Oncogenesis and Herpesvirus II. Part 2: Epidemiology, Host Response and Control. Proceedings of a Symposium held in Nuremburg, Federal Republic of Germany, 14-16 October 1974.* International Agency for Res. on Cancer. (Lyon, France): pp. 79-87; 1975.

2147 THE CHARACTERIZATION OF AN IN VITRO ISOLATED NUCLEI SYSTEM FOR THE INVESTIGATION OF THE MECHANISM OF HERPESVIRUS DNA REPLICATION IN INFECTED HUMAN EMBRYONIC LUNG CELLS. (Eng.) Kolber, A. In: *Tumor Virus-Host Cell Interaction.* Edited by A. Kolber. (New York: Plenum Press): pp. 427-443; 1975.

2148 STRUCTURE AND FUNCTION OF HERPESVIRUS SAIMIRI DNA. (Eng.) Fleckenstein, B.; Bornkamm, G. W. In: *Oncogenesis and Herpesvirus II. Part 1: Biochemistry of Viral Replication and In Vitro Transformation. Proceedings of a Symposium held in Nuremburg, Federal Republic of Germany, 14-16 October 1974.* International Agency for Res. on Cancer. (Lyon, France): pp. 145-149; 1975.

2149 STUDIES OF THE DNA OF HERPESVIRUS SAIMIRI. (Eng.) Goodheart, C. R.; Miyagi, M. In: *Oncogenesis and Herpesviruses II. Part 1: Biochemistry of Viral Replication and In Vitro Transformation.*

Proceedings of a Symposium held in Nuremburg, Federal Republic of Germany, 14-16 October 1974. International Agency for Res. on Cancer. (Lyon, France): pp. 151-154; 1975.

2150 SOME BIOLOGICAL PROPERTIES OF HERPESVIRUS SAIMIRI FROM CHRONOLOGICALLY INFECTED MONOLAYER AND SUSPENSION CULTURES. (Eng.) Didier, M. L.; Ablashi, D. V.; Oie, H. K.; Armstrong, G. R.; Easton, J. M.; Chu, E. W.; Rabson, A. S. In: *Oncogenesis and Herpesvirus II. Part 1: Biochemistry of Viral Replication and In Vitro Transformation. Proceedings of a Symposium held in Nuremberg, Federal Republic of Germany, 14-16 October 1974.* International Agency for Res. on Cancer. (Lyon, France): pp. 491-495; 1975.

2151 LATENCY OF HERPES SIMIAE (B VIRUS) IN RABBITS. (Eng.) Vizoso, A. D. (Unit for Invertebrate Biology, 5 South Parks Road, Oxford, England). *Br J Exp Pathol* 56(6): 489-494; 1975.

See also:

* (Rev): 1806, 1815, 1816, 1817, 1818, 1819, 1820, 1821, 1822, 1823, 1824, 1829, 1843, 1846, 1850, 1851, 1852, 1853, 1854, 1855, 1856, 1857, 1858, 1859, 1860, 1866
* (Immun): 2168, 2169, 2170, 2171, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189
* (Path): 2244, 2300
* (Epid-Biom): 2321

2152 IMMUNE DEFICIENCY, AUTOIMMUNITY AND AGING. (Eng.) Yunis, E. J. (Univ. Minnesota Medical Sch., Minneapolis, MN); Fernandes, G.; Greenberg, L. J. *Birth Defects* 11(1): 185-192; 1975.

Aging in man and lower animals is accompanied by a decline in vigor of both humoral and cell-mediated immunity, the latter suffering a very sharp decline in man after age 50. Certain autoimmune phenomena also appear to be related to aging. Although the mechanism that controls the normal tolerance to self-antigens is not clear, pathological changes in the thymus have been linked to diseases such as myasthenia gravis and lupus erythematosus, which have autoimmune components. Aged mice from short-lived strains such as strain A show a propensity to produce autoantibodies and a decline in T lymphocytes. Both the survival and the immunological function of neonatally thymectomized strain A mice could be better improved either by ip thymus grafts of 10^8 spleen cells given ip from young syngeneic mice than by thymus grafts or spleen cells from aged mice. Survival at 8 mo was 85% and 35% and immunological reconstitution 73% and 11% with spleen cells from 4- and 24-mo sources, respectively; survival at 8 mo was 46% and 23% and immunological reconstitution 32% and 5% with thymus grafts from 4- and 24-mo sources, respectively. The decline of postthymic cells or T cells during aging is attributable to a thymic defect or to involution of the thymus itself; the stem cell compartment in aged mice is not abnormal. Susceptibility to a variety of murine autoimmune and neoplastic diseases is partially under the control of a gene (or genes) that is closely associated with the region of the H-2 gene complex.

2153 TUMOR ANGIOGENESIS: EFFECT ON TUMOR GROWTH AND IMMUNITY. (Eng.) Folkman, J.; Klagsbrun, M. In: *Fundamental Aspects of Neoplasia.* Edited by A. A. Gottlieb; O. J. Plescia; D. H. L. Bishop. (New York: Springer-Verlag): pp. 401-412; 1975.

The role of tumor angiogenesis in tumor growth and immunity is reviewed. Tumors stimulate neovascularization by releasing a diffusible material, tumor angiogenesis factor (TAF), which can be bioassayed in the chorioallantoic membrane of the 10- to 11-day-old chick embryo or the rabbit cornea. Tumor cells appear capable of synthesizing TAF in the absence of cell division. Angiogenesis capacity may appear months before malignancy is recognizable. The capacity of solid tumors to produce TAF dissociates their growth into two phases, the avascular and vascular phases. A major characteristic of the avascular phase is that tumor growth is limited to a diameter of 1-2 mm and if this period is prolonged, tumors become dormant at approximately this diameter. This dormancy is probably due to the limited diffusion of nutrients and wastes in a three-dimensional or spheroidal tumor population. The identifying characteristic of the vascular phase is rapid tumor growth.- A new hypothesis relating tumor immunity and tumor angiogenesis states that although tumor angiogenesis can operate independently of the immune system, the type of immune reaction against a tumor is strongly influenced by the state of vascularization. In terms of the proximity of a tumor population to capillaries, there may be three general patterns, each of which would influence the host's immune response in a different way. In the avascular tumor with remote capillaries, the tumor population would be so far from the nearest capillary (2,000-5,000 u) that immunocompetent cells could not be delivered in sufficient numbers to cause rejection. In the avascular tumor with contiguous capillaries (at a distance of 500 u), the tumor might be accessible to immune cells but might not be susceptible to blocking. In a sensitized host such a tumor would be especially vulnerable to immune rejection. In the vascularized tumor penetrated by capillaries, most tumor cells would lie less than 100 u from the nearest open capillary, so that immune cells could easily be delivered into the tumor in large number, but blocking might also be facilitated. Once it becomes possible to prevent tumor vascularization, antiangiogenesis might be used as a therapeutic adjunct to synergize immunotherapy.

2154 ANTITUMOUR POLYSACCHARIDES AND HOST DEFENSE AGAINST CANCER. (Eng.) Maeda, Y. Y.; Ishimura, K.; Takasuka, N.; Sasaki, T.; Chihara, G. In: *Host Defense Against Cancer and Its Potentiation. Proceedings of the 5th International Symposium of The Princess Takamatsu Cancer Research Fund, Tokyo, 1975.* (Baltimore: Univ. Park Press): pp. 181-197; 1975.

The antitumor effect of numerous basidiomycetes belonging to the Polyporaceae and Tricholomataceae families was examined in mice and a polysaccharide, lentinan, was isolated from one of the edible mushrooms, *Lentinus edodes*. Lentinan showed a strong antitumor activity against sarcoma-180 transplanted in Swiss, ICR, or BALB/c mice, but was ineffective against the same tumor transplanted in C3H/f or CBA mice. The action of lentinan and other antitumor polysaccharides is not a direct cytotoxicity against tumor cells, and there exists a characteristic optimal dose (1-2 mg/kg for 10 days: lentinan) in their antitumor effect. Antitumor activity is greatly inhibited by thyroxine or hydrocortisone. Lentinan and other polysaccharides do not show any antitumor activity in neonatally thymectomized mice, which indicates that the thymus or T cells take part in this activity. These polysaccharides do not stimulate the conventional immune responses, including the reticuloendothelial system. There is a marked increase in three kinds of serum protein in ICR mice 4 days after administration of 4 mg/kg lentinan for 5 days. These proteins may be a new factor in the mechanism of lentinan as a T-helper cell stimulant or restorer.

2155 THE ROLE OF ADHERENT CELLS IN THE IMMUNE RESPONSE. FIBROBLASTS AND PRODUCTS RELEASED BY FIBROBLASTS AND PERITONEAL CELLS CAN SUBSTITUTE FOR ADHERENT CELLS. (Eng.) Moeller, G. (Wallenberglaboratory, Karolinska Inst., S-104 05

Stockholm, Sweden); Lemke, H.; Opitz, H.-G. *Scand J Immunol* 5(3): 269-280; 1976.

The primary immune response to SRBC in adherent cell-depleted cultures was restored by adding a critical number of mouse peritoneal cells. Complete substitution was achieved also with supernatants from allogeneic and syngeneic peritoneal cells. Both living fibroblasts and supernatants from fibroblast cultures were highly efficient substitutes for adherent cells in both syngeneic and allogeneic systems. Supernatants from non-antigen-treated peritoneal cells and fibroblasts increased DNA synthesis and induced polyclonal antibody synthesis in normal spleen cells. Thus, adherent cells need not function in the immune response by presenting antigen to the B cells via immunoglobulin T or by releasing signal 2 activity, which acts on lymphocytes that have already received signal 1.

2156 IMMUNE RESPONSE OF BALB/C X DBA/2 F_1 MICE TO A TUMOR ALLOGRAFT DURING PYRAN COPOLYMER-INDUCED TUMOR ENHANCEMENT. (Eng.) Schultz, R. M. (Viral Biology Branch, Natl. Cancer Inst., Bethesda, MD 20014); Woods, W. A.; Mohr, S. J.; Chirigos, M. A. *Cancer Res* 36(5): 1641-1646; 1976.

The immune response of BALB/c x DBA/2 F_1 mice to a transplantable Moloney leukemia virus-induced tumor allograft (MBL-2) was studied to determine the mechanism of pyran copolymer-induced tumor enhancement. The relative levels of humoral, lymphocyte, and macrophage response were followed chronologically by in vitro cytotoxic microassays with ^{51}Cr-labeled target cells. Pyran increased the titer of humoral cytotoxic antibody, but levels of humoral factor capable of abrogating lymphocytoxicity were not enhanced. Splenic lymphocyte-mediated cytotoxicity, although slightly diminished in pyran-treated mice, was not significantly affected. Macrophages from allograft-bearing animals exhibited marked tumoricidal activity, which was augmented by pyran treatment. This macrophage-associated activity was specific for MBL-2 cells and not attributable to cytotoxins elaborated into the culture medium. Pyran slightly activated macrophages from nonsensitized mice to become cytotoxic for MBL-2 cells; activation was not T-cell dependent. However, strikingly fewer macrophages infiltrated the allograft in pyran-treated animals as judged by both histopathology and direct measurement. The defect in the migration or deposit of macrophages at the allograft site may have contributed to tumor enhancement.

2157 ALPHA-FETOPROTEIN SYNTHESIS BY MURINE LYMPHOID CELLS IN ALLOGENEIC REACTIONS. (Eng.) Keller, R. H. (Mayo Medical Sch., Rochester, MN 55901); Tomasi, T. B., Jr. *J Exp Med* 143(5): 1140-1153; 1976.

This study was undertaken to examine the role of α-fetoprotein (AFP) in murine graft versus host (GVH) reactions. Surface-bound AFP was demonstrated by immunofluorescence on approximately one-third of splenic lymphocytes in chronic GVH reactions. Splenic lymphocytes also had a suppressed phytohemagglutinin (PHA) response compared to controls, while lymph node cells from the same GVH animals revealed no surface AFP and had normal PHA responses. Splenic lymphocytes showed marked synthesis of AFP in the GVH and mixed lymphocyte culture (MLC) reactions by [^{14}C]-leucine incorporation and by radioimmunoassay in MLC supernates. Lymph node cells demonstrated less synthetic activity, and ^{14}C counts in their membrane fractions were elevated markedly. The synthesis of AFP by spleen cells increased with the length of the allogeneic stimulus up to 8 wk. The pattern of AFP and total protein synthesis was cyclic. Pulse experiments with [^{14}C]-leucine demonstrated that high membrane AFP was associated with a marked decrease in total protein synthesis by spleen cells in the next 12 hr, while low membrane AFP was associated with marked protein synthesis. This suggests that AFP could function as a negative feedback signal. An allogeneic stimulus resulting in blast transformation and synthesis of AFP could lead to defective tumor surveillance and/or antiviral immunity. Also, AFP could promote viral proliferation since it inhibits both cell mediated cytotoxicity and antibody synthesis. This inhibition of antibody synthesis in the area surrounding a developing tumor could allow the first malignant cells to survive and escape the subsequent immune response.

2158 GENETIC RESISTANCE TO MARROW TRANSPLANTATION AS A LEUKEMIA DEFENSE MECHANISM. (Eng.) Gallagher, M. T. (Baylor Coll. Medicine, Houston, TX 77030); Lotzova, E.; Trentin, J. J. *Biomedicine [Express]* 25(1): 1-3; 1976.

The ability of resistant (C57 x AKR)F_1 and nonresistant (C3H x AKR)F_1 mice to recognize and reject malignant lymphoid cells, in comparison to normal marrow cells of the same strain, was studied. Transplantation of AKR lymphoma cells into lethally irradiated resistant and nonresistant hybrids produced lymphomatous spleen colonies in nonresistant hybrids but not in resistant hybrids. Thus, resistant hybrids can recognize and reject AKR lymphoma cells, but not normal AKR bone marrow cells. A normal biological role of lymphoma surveillance is postulated for genetic resistance.

2159 VASOFORMATIVE SARCOMAS ARISING FROM BALB/3T3 CELLS ATTACHED TO SOLID SUBSTRATES. (Eng.) Boone, C. W. (Viral Carcinogenesis Lab., Natl. Cancer Inst., Bethesda, MD 20014); Takeichi, N.; Paranjpe, M.; Gilden, R. *Cancer Res* 36(5): 1626-1633; 1976.

The production of vasoformative sarcomas from sc implants of substrate-attached BALB/3T3 cells was studied in male BALB/c mice. The cell line produced tumors within 2-3 mo when an average of 3 x 10^4 cells were implanted sc attached to 1 x 5 x 10 mm polycarbonate platelets. Plastic platelets alone produced no tumors after 1 yr of observation. The tumors, as well as others arising from implants of BALB/3T3 attached to 3 mm glass beads, were given the histological diagnosis of ''vasoformative sarcoma'' because the tumor cells frequently formed vascular channels. The vasoformative pattern and the results of specific staining for reticulin and collagen support the likelihood that BALB/3T3 cells originated from endothelial cells rather than from fibroblasts. That the tumors were derived from BALB/3T3 cells and not host cells was proved when tumors arising in BALB/c x C57BL/6 F_1 hybrids were shown to be transplantable to BALB/c but not to C57BL/6 mice. The cultured tumor cells showed loss of both postconfluence inhibition of proliferation and anchorage dependence. Evidence of the induction of endogenous oncornaviruses was obtained in only one of four tumors tested. These tumors also exhibited tumor-unique transplantation rejection antigens. It is concluded that BALB/3T3 cells are preneoplastic and give rise to different spontaneously transformed clones bearing unique tumor rejection antigens when implanted in vivo attached to a solid substrate.

2160 INFLUENCE OF HUMORAL REGULATORS ON PROLIFERATION AND MATURATION OF NORMAL AND LEUKEMIC CELLS.

(Eng.) Karp, J. E. (Johns Hopkins Univ. Sch. Medicine, Baltimore, MD 21205); Burke, P. J. *Cancer Res* 36(5): 1674-1679; 1976.

To determine the function and to compare the effect of serum factors that influence the proliferation of marrow elements, cells were obtained from patients with normal and leukemic bone marrows. The effects of drug-induced stimulatory and inhibitory sera and leukemic pretreatment sera over time (0 to 6 days) on proliferation and granulocytic morphology of normal and leukemic bone marrow cells in culture were evaluated. Increased proliferation was associated with stimulatory sera, while inhibitory and leukemic pretreatment sera retarded proliferation of both normal and malignant cells. Exposure of normal proliferative cells to inhibitory or leukemic pretreatment sera yielded the greatest increase in mature granulocyte forms. In contrast, although the proliferative response of leukemic cells to these sera was similar to normal, maturation was minimal. These data suggest that leukemic pretreatment sera are similar to inhibitory sera and are not leukemogenic.

2161 CHARACTERIZATION OF AMYLOID FIBRIL PROTEINS FROM MEDULLARY CARCINOMA OF THE THYROID.

(Eng.) Sletten, K. (Dept. Biochemistry, Univ. Oslo, Oslo, Norway); Westermark, P.; Natvig, J. B. *J Exp Med* 143(4): 993-998; 1976.

Amyloid fibrils from two different tissues of medullary carcinoma of the thyroid (MCT) were studied. The fibrils mainly consisted of a low molecular weight protein, A-MCT, which was immunologically distinct and did not react with various antisera against known amyloid fibril proteins. A specific antiserum raised against the MCT amyloid proteins gave a reaction of identity with the degraded MCT amyloid fibrils from two patients, as well as with the isolated A-MCT protein, but showed no reaction with other known amyloid proteins. The A-MCT protein had a blocked N terminus, but the sequence analysis of cyanogen bromide fragment revealed similarity with human calcitonin in the 11 positions studied. However, the different amounts of phenylalanine and threonine in A-MCT and calcitonin indicate either a pathological condition or genetic variation, and the mol wt of 5,700 daltons was considerably larger than that of calcitonin. For these reasons the A-MCT protein may represent a prohormone of calcitonin.

2162 IDENTIFICATION AND SUBCELLULAR LOCALIZATION OF A SARCOMA-ASSOCIATED ANTIGEN(S) IN A HUMAN CELL LINE.

(Eng.) Lichtiger, B. (M. D. Anderson Hosp. and Tumor Inst., 6723 Bertner Ave., Houston, TX 77025); Trujillo, J. M.; Burk, K. H.; Drewinko, B. *Cancer* 37(4): 1788-1799; 1976.

The subcellular localization of sarcoma-associated antigen(s) (TAA) in an established human neurogenic sarcoma line (T_2 cell line) was identified. Indirect immunofluorescence was used to screen sera from patients with sarcoma, nonsarcoma neoplasias, and from presumably normal blood bank donors. The positive sera were submitted to a series of absorptions to remove possible nonspecific cross-reacting antibodies. The target cells were then studied with electron microscopy, with use of the indirect immunoperoxidase technique to determine the subcellular localization of the sarcoma-associated antigen(s). The findings indicated that sarcoma-bearing patients have circulating antisarcoma antibodies directed to antigen(s) localized at the surface membrane of T_2 cells. These antibodies pertain to the IgM or IgG immunoglobulin class. The results strongly suggest that the sarcoma-associated antigen(s) represent a new type of tumor-associated antigen(s).

2163 SHARED ANTIGENS BETWEEN BACTERIA AND GUINEA PIG LINE 10 HEPATOCARCINOMA CELLS.

(Eng.) Minden, P. (Natl. Jewish Hosp. and Res. Center, Denver, CO 80206); Sharpton, T. R.; McClatchy, J. K. *Cancer Res* 36(5): 1680-1685; 1976.

Listeria monocytogenes, *Brucella abortus*, and *Salmonella typhimurium* were studied to determine whether they share antigenic components with guinea pig line 10 hepatocarcinoma cells. Rabbits were immunized with sonicates of these bacteria, line 10 tumor cells, or line 1 cells (a tumor with antigenic characteristics different from those of line 10). The binding of antibodies to radiolabeled antigens prepared from extracts of bacteria and line 10 cells was studied by precipitation of radiolabeled antigen-antibody complexes with antirabbit immunoglobulin. Antibodies in sera from rabbits immunized with these bacteria and line 10 cells bound both the labeled bacteria and line 10 antigens, while those from rabbits immunized with line 1 cells did not bind the bacterial antigens. Inhibition studies involving reaction between radiolabeled *Listeria* and line 10 antigens and antibodies to *Listeria* and line 10 cells confirmed that the binding reactions were specific and that line 10 cells shared antigens with *Listeria* cells. The possibility that *B. abortus* and *S. typhimurium* also shared antigens with line 10 cells is suggested.

2164 CHARACTERIZATION OF CARCINOEMBRYONIC ANTIGEN FRACTIONATED BY CONCANAVALIN A CHROMATOGRAPHY. (Eng.) Slayter, H. S. (Harvard Medical Sch., Boston, MA 02115); Coligan, J. E. *Cancer Res* 36(5): 1696-1704; 1976.

A small percentage (15%) of particles morphologically distinct from carcinoembryonic antigen (CEA) crullerlike particles (about 9 x 40 nm; previously presumed to be impurities) was removed from CEA preparations by concanavalin A (Con A) affinity chromatography. The first of four affinity fractions constituted 45% of the recovered weight; the last, which constituted 17% of the recovered weight, was obtained only after a 2-day soak in 20% α-D-mannopyranoside. The affinity fractions were of essentially equivalent specific activity, morphology, and composition. They all demonstrated markedly different chemical compositions and an approximately 100-fold higher specific activity than the bulk of the nonaffinity material. Thus, the bulk of the Con A-nonbound fractions apparently is not CEA but contaminating particles of several different varieties. Compositional analyses further indicated that the mannose content of various CEA fractions was directly correlated with Con A binding affinity, amino acid content, morphological type, and CEA specific activity. This led to the conclusion that the protein chain of the various CEA preparations fractionated is characteristic. An attempt to fractionate very impure crude CEA by Con A affinity chromatography indicated that this scheme cannot by itself produce CEA as pure as that obtained by standard methods. Thus for the first time the effectiveness of the purification of a glycoprotein was successfully monitored by electron microscopy, demonstrating that the crullerlike appearance of the CEA particle is closely related to antigenic specificity.

2165 SIMILARITIES OF SURFACE CHARACTERISTICS OF NEOPLASTIC WELL-DIFFERENTIATED LYMPHOCYTES FROM SOLID TISSUES AND FROM PERIPHERAL BLOOD. (Eng.) Braylan, R. C. (Pathology Lab., Natl. Cancer Inst., Bethesda, MD 20014); Jaffe, E. S.; Burbach, J. W.; Frank, M. M.; Johnson, R. E.; Berard, C. W. *Cancer Res* 36(5): 1619-1625; 1976.

Cells from spleens and lymph nodes infiltrated with neoplastic well-differentiated lymphocytes (WDLT) were investigated for the presence of receptors for unsensitized SRBC antigen-antibody-complement complexes (IgM EAC), and antigen-antibody complexes, as well as for the presence of surface immunoglobulins. The cells were also examined by scanning electron microscopy (SEM). The surface markers and ultrastructure of WDLT cells were compared with those of cells from peripheral blood of patients with chronic lymphocytic leukemia (CLL). Like the CLL populations, most WDLT samples showed a low percentage of unsensitized SRBC-binding cells and a concomitantly high percentage of IgM EAC-binding cells. Furthermore, a substantial number of WDLT cells in several instances showed a lower binding affinity for IgM EAC than normal lymphocytes. Weak IgM EAC binding capacity was demonstrated in the CLL cells as well. WDLT and CLL cells bound the IgG EA complex only when certain sensitive techniques were applied (pelleting). A variable percentage of cells with surface immunoglobulins was found among WDLT and CLL populations. SEM did not reveal specific changes in WDLT or CLL cells that would permit their identification as neoplastic lymphocytes. No major differences were found between WDLT and CLL cells, and no correlation could be established between SEM appearances and surface markers. The conditions under which the cells were manipulated before fixation (in particular the environmental temperature) seemed to play a major role in the final SEM appearance of both WDLT and CLL cells. The results indicate that WDLT cells represent a population of B-cells whose surface properties are very similar to those of circulating CLL cells. The poor capacity of WDLT cells and CLL cells to bind IgM EAC or to stain with fluorescein-conjugated antihuman immunoglobulin suggests low density or poor affinity of the surface receptors. In this regard, these neoplastic cells are different from those of follicular lymphomas, also of B-cell origin.

2166 DEOXYNUCLEOTIDE-POLYMERIZING ENZYME ACTIVITIES IN T- AND B-CELLS OF ACUTE LYMPHOBLASTIC LEUKEMIA ORIGIN. (Eng.) Srivastava, B. I. S. (New York State Dept. Health, Buffalo, NY 14263). *Cancer Res* 36(5): 1825-1830; 1976.

The five thymus-dependent cell (T-cell) lines (Molt-3; Molt-4; RPMI-8402; CCRF-CEM; CCRF-HSB-2) and seven thymus-independent cell (B-cell) lines (RPMI-8382, RPMI-8392, RPMI-8412, RPMI-8422, RPMI-8432, RPMI-8442, CCRF-SB) established from acute lymphoblastic leukemia patients were examined for deoxynucleotide polymerizing enzymes. All T- and B-cells had DNA polymerase γ, DNA polymerase β, and terminal deoxynucleotidyl transferase both in the soluble and chromatin fractions, whereas DNA polymerase α was found only in the soluble fraction. With respect to their sedimentation and chromatographic behavior, template-primer requirements, Km for deoxythymidine triphosphate or deoxyguanosine triphosphate divalent cation preference, effect of NaCl and inhibitors, the enzymes from T- and B-cells resembled each other and those from other mammalian cells. DNA polymerase α, β, and γ from T-cells like those from "fresh" acute lymphoblastic leukemia cells, were more thermolabile than those from B-cells of phytohemagglutinin-stimulated normal lymphocytes. In addition, the terminal deoxynucleotidyl transferase from the above cells was completely inactivated in 5 to 6 min at 50 C, whereas the DNA polymerases α, β, and γ retained considerable activity even after heating for 25 min at 50 C. DNA polymerase activity of the soluble fraction from T-cells was of the same magnitude as in B-cells when expressed on a DNA basis, but twice that of B-cells when expressed on a protein basis. High terminal deoxynucleotidyl transferase activity, equivalent to that observed in acute lymphoblastic leukemia cells, was found in all T-cell lines which, when expressed on a DNA basis, was 30 to 100 times higher than the B-cell lines tested. These results support the suggestion of earlier investigators that T-cell lines examined here may have originated from leukemic cells.

2167 IMPAIRMENT OF ROSETTE-FORMING T LYMPHOCYTES IN PATIENTS WITH PRIMARY INTRACRANIAL TUMORS. (Eng.) Brooks, W. H. (Veterans Admin. Hosp., Lexington, KY 40506); Roszman, T. L.; Rogers, A. S. *Cancer* 37(4): 1869-1873; 1976.

The percentage of T lymphocytes that form rosettes (RFC) with SRBC (E rosettes), cutaneous delayed-type hypersensitivity, and in vitro lymphocyte transformation was measured in 15 patients with primary intracranial tumors. The ability of T lymphocytes to form E rosettes was significantly impaired. These patients also exhibited impaired ability to become sensitized to dinitrochlorobenzene, and humoral suppression of phytohemagglutinin-induced lymphocyte blastogenesis. The hypothetical role of antibody(s) to possible shared antigenic determinants on brain and T cells is discussed.

2168 IMMUNOLOGICAL STUDIES WITH HAMSTER CELLS TRANSFORMED BY CYTOMEGALOVIRUS AND HERPES SIMPLEX VIRUS TYPE 1. (Eng.) Lausch, R. N.; Murasko, D. M.; Jones, C.; Hay, K. A. In: *Oncogenesis and Herpesvirus II. Part 1: Biochemistry of Viral Replication and In Vitro Transformation. Proceedings of a Symposium held in Nuremburg, Federal Republic of Germany, 14-16 October 1974.* International Agency for Res. on Cancer. (Lyon, France): pp. 315-321; 1975.

2169 CYTOMEGALOVIRUS INFECTION OF POLYMORPHONUCLEAR AND MONONUCLEAR LEUKOCYTES IN IMMUNOSUPPRESSED TRANSPLANT PATIENTS, PATIENTS WITH CMV MONONUCLEOSIS AND A PATIENT WITH LEUKAEMIA. (Eng.) Fiala, M.; Austin, T.; Heiner, D. C.; Imagawa, D. T.; Guze, L. B.; Payne, J. E. In: *Oncogenesis and Herpesviruses II. Part 2: Epidemiology, Host Response and Control. Proceedings of a Symposium held in Nuremburg, Federal Republic of Germany, 14-16 October 1974.* International Agency for Res. on Cancer. (Lyon, France): pp. 109-112; 1975.

2170 IMMUNOLOGICAL ASPECTS OF HERPESVIRUS INFECTIONS IN PRIMATES. (Eng.) Kalter, S. S.; Heberling, R. L.; Felsburg, P. J.; McCullough, B.; Eichberg, J. W.; Kniker, W. T.; Harvey, J. S., Jr.; Macias, E. G.; Eller, J. J.; Rommel, F. A.; Steele, R. W. In: *Oncogenesis and Herpesvirus II. Part 2: Epidemiology, Host Response and Control Proceedings of a Symposium held in Nuremberg, Federal Republic of Germany, 14-16 October 1974.* International Agency for Res. on Cancer. (Lyon, France): pp. 133-135; 1975.

2171 ANTIGENIC RELATIONSHIP BETWEEN HERPES SIMPLEX VIRUSES, HUMAN CERVICAL CANCER AND HSV-ASSOCIATED HAMSTER TUMOURS. (Eng.) Nahmias, A. J.; Del Buono, I.; Ibrahim, I. In: *Oncogenesis and Herpesviruses II. Part 1: Biochemistry of Viral Replication and In Vitro Transformation. Proceedings of a Symposium held in Nuremburg, Federal Republic of Germany, 14-16 October 1974.* International Agency for Res. on Cancer. (Lyon, France): pp. 309-313; 1975.

2172 STUDY OF THE EFFECTS OF INTRATUMOROUSLY INJECTED BACTERIAL AND VIRAL NEURAMINIDASE IN RATS. (Fre.) Binder, P. (Centre de Recherches du Service de Sante des Armees, 108, boulevard Pinel, 69272 Lyon Cedex 1, France); Perrot, L.; Beaudry, Y.; Bottex, C.; Fontanges, R. *C R Acad Sci (D) (Paris)* 281(20): 1545-1547; 1975.

2173 RESURGENCE OF MAMMARY TUMORS IN IMMUNODEPRESSED C3HF MICE (Proceedings Abstract). (Eng.) Lemonde, P. (Armand-Frappier Inst., Ville-de-Laval, P.Q., Canada); Berthiaume, L.; Lussier, G. *Proc Am Assoc Cancer Res* 17: 223; 1976.

2174 EFFECT OF SPECIFIC SOLUBLE TUMOR ANTIGENS ON IMMUNE RESPONSES TO MAMMARY TUMORS IN MICE (Proceedings Abstract). (Eng.) Stutman, O. (Memorial Sloan-Kettering Cancer Center, New York, NY 10021). *Proc Am Assoc Cancer Res* 17: 61; 1976.

2175 A FAMILY STUDY OF REACTIVITY TO VIRAL AND MAMMARY TUMOR ASSOCIATED ANTIGENS (Proceedings Abstract). (Eng.) Wiseman, C. (Univ. Texas System Cancer Center, M. D. Anderson Hosp. and Tumor Inst., Houston, TX 77025); Bowen, J.; Blumenschein, G.; Hersh, E.; Jackson, B.; Sullivan, M. *Proc Am Assoc Cancer Res* 17: 191; 1976.

2176 AUTOGENOUS IMMUNITY TO MOUSE MAMMARY TUMOR VIRUS IN HIGH AND LOW MAMMARY TUMOR BEARING MICE (Proceedings Abstract). (Eng.) Fine, D. L. (NCI Frederick Cancer Res. Center, Frederick, MD 21701); Arthur, L. O.; Ihle, J. N. *Proc Am Assoc Cancer Res* 17: 161; 1976.

2177 CORRELATION BETWEEN THE CLINICAL STATUS OF MICE BEARING MTV INDUCED MAMMARY TUMORS AND THEIR LYMPHOCYTE RESPONSE TO ANTIGEN AND MITOGEN (Proceedings Abstract). (Eng.) Laing, C. A. (Mount Sinai Sch. Medicine, New York, NY 10029). *Proc Am Assoc Cancer Res* 17: 183; 1976.

2178 QUANTITATIVE IN VIVO CHARACTERIZATION OF SV40 TUMOR-SPECIFIC TRANSPLANTATION ANTIGENS (TSTA) OF THE MOUSE (Proceedings Abstract). (Eng.) Henriksen, O. (NIH, Bethesda, MD 20014); Law, L. W.; Appella, E. *Proc Am Assoc Cancer Res* 17: 140; 1976.

2179 EVALUATION OF CELL-MEDIATED IMMUNITY IN SV40 INDUCED TUMOR-BEARING MICE TO GENERAL STIMULANTS AND TUMOR-ASSOCIATED ANTIGENS (Proceedings Abstract). (Eng.) Dean, J. H. (Litton Bionetics, Inc., Kensington, MD 20795); Padarathsingh, M. L.; McCoy, J. L.; Lewis, D. D.; Northing, J. W.; Law, L. W. *Proc Am Assoc Cancer Res* 17: 136; 1976.

2180 CELL-MEDIATED IMMUNITY (CMI) TO HSV-2 ANTIGENS IN PATIENTS WITH CERVIX CANCER (Proceedings Abstract). (Eng.) Aurelian, L. (Johns Hopkins Univ., Baltimore, MD 21205); Bell, R. B.;

Jacobs, R. P.; Donnenberg, A. *Proc Am Assoc Cancer Res* 17: 149; 1976.

2181 DIC-INDUCED IMMUNOGENICITY IN MURINE LEUKEMIAS (Proceedings Abstract). (Eng.) Nicolin, A. (Inst. Pharmacology, Univ. Milan, Italy); Missiroli, A.; Canti, G.; Goldin, A. *Proc Am Assoc Cancer Res* 17: 53; 1976.

2182 T CELL RESPONSE IN H-2 CONGENIC MICE TO FRIEND VIRUS-INDUCED TUMOR CELL LINES (Proceedings Abstract). (Eng.) Blank, K. J. (Albert Einstein Coll. Medicine, Bronx, NY 10461); Freedman, H. A.; Lilly, F. *Proc Am Assoc Cancer Res* 17: 96; 1976.

2183 THE ROLE OF MAJOR VIRAL STRUCTURAL PROTEINS IN THE IMMUNE RESPONSE TO FRIEND VIRUS INDUCED MURINE LEUKEMIA (Proceedings Abstract). (Eng.) Rogers, M. J. (NIH, Bethesda, MD 20014); Law, L. W.; Oroszlan, S.; Ting, C.-C.; Appella, E. *Proc Am Assoc Cancer Res* 17: 148; 1976.

2184 KINETICS OF THE CELL-MEDIATED IMMUNE RESPONSE TO MOLONEY MURINE SARCOMA VIRUS (M-MSV) AS MEASURED BY MACROPHAGE MIGRATION INHIBITION (Proceedings Abstract). (Eng.) Landolfo, S. (NCI, Bethesda, MD 20014); Holden, H. T. *Proc Am Assoc Cancer Res* 17: 203; 1976.

2185 CELL MEDIATED AND HUMORAL IMMUNITY STUDIES OF FELINE SARCOMA VIRUS (FESV) INDUCED TUMORS IN SHEEP (Proceedings Abstract). (Eng.) Theilen, G. H. (Univ. California, Davis, CA 95616); Pedersen, N. C. *Proc Am Assoc Cancer Res* 17: 151; 1976.

2186 ANTIBODIES IN HUMAN SERA TO ONCORNAVIRUS-LIKE COMPONENTS FROM HUMAN MARROW CULTURES (Proceedings Abstract). (Eng.) Louie, S. (Ontario Cancer Inst., Toronto, Canada); Curtis, J. E.; McCulloch, E. A. *Proc Am Assoc Cancer Res* 17: 34; 1976.

2187 IN VIVO PROTECTION AGAINST SYNGENEIC CROSS VIRUS-INDUCED LYMPHOMA IN RATS: COMPARISON WITH IN VITRO STUDIES OF CELL-MEDIATED IMMUNITY (Proceedings Abstract). (Eng.) Glaser, M. (NIH, Bethesda, MD 20014); Lavrin, D. H.; Herberman, R. B. *Proc Am Assoc Cancer Res* 17: 12; 1976.

2188 MIGRATION INHIBITION FACTOR (MIF) INDUCED BY PARTICLES OF DENSITIES 1.22-1.16 G/ML FROM LEUKEMIC MARROW CELL CULTURE SUPERNATANTS (Proceedings Abstract). (Eng.) Curtis, J. E. (Ontario Center Inst., Toronto, Canada M4X 1K9); McCulloch, E. A. *Proc Am Assoc Cancer Res* 17: 180; 1976.

2189 PERMANENT LOSS OF ANTIGENICITY IN LYMPHOMA CELLS INDUCED BY PASSAGE THROUGH X-IRRADIATED HOSTS (Proceedings Abstract). (Eng.) Pearse, A. (Depts. Pathology, Lenox Hill Hosp. and Coll. of Physicians and Surgeons of Columbia Univ., New York, NY 10021); Keller, S.; Ioachim, H. L. *Proc Am Assoc Cancer Res* 17: 69; 1976.

2190 HOST FACTORS INFLUENCING MAMMARY AND OVARIAN TUMORIGENESIS IN NEONATALLY THYMECTOMIZED MICE. (Eng.) Nizhizuka, Y.; Sukakura, T. In: *Host Defense Against Cancer and Its Potentiation. Proceedings of the 5th International Symposium of The Princess Takamatsu Cancer Research Fund, Tokyo, 1975.* (Baltimore: Univ. Park Press): pp. 265-279; 1975.

2191 HETEROANTISERA TO HUMAN LEUKEMIA ASSOCIATED ANTIGENS (Proceedings Abstract). (Eng.) Lozzio, B. B. (Univ. Tennessee Memorial Res. Center, 1924 Alcoa Highway, Knoxville, TN 37920); Avery, B.; Sonoda, T.; Ebenezer, A.; Whitson, M. E.; Krauss, S. *IRCS Med Sci (Suppl)* 3(10): 13; 1976.

2192 FURTHER CHARACTERIZATION OF THE CHRONIC MYELOGENOUS LEUKEMIC (CML) CELL LINE K-562, WITH THE PHILADELPHIA CHROMOSOME (Proceedings Abstract). (Eng.) Ichiki, A. T. (Univ. Tennessee Memorial Res. Center, Knoxville, TN 37920); Bamberger, E. G.; Lozzio, C. B.; Lozzio, B. B.; Girardi, A. J. *IRCS Med Sci (Suppl)* 3(10): 12; 1976.

See also:

* (Rev): 1815, 1816, 1817, 1823, 1824, 1825, 1826, 1827, 1829, 1859, 1860, 1861, 1862
* (Chem): 1881, 1890, 1953, 1986
* (Phys): 2016
* (Viral): 2035, 2036, 2041, 2059, 2068, 2081, 2094, 2098, 2103, 2104, 2105, 2115, 2119, 2127, 2136, 2142, 2146, 2151
* (Path): 2193, 2243, 2247, 2281, 2294
* (Epid-Biom): 2321, 2322, 2323

2193 ISOLATION OF A NOVEL GLYCOPROTEIN (EDC1) FROM THE URINE OF A PATIENT WITH ACUTE MYELOCYTIC LEUKEMIA. (Eng.) Rudman, D. (Emory Univ. Sch. Medicine, Atlanta, GA 30322); Chawla, R. K.; Hendrickson, L. J.; Vogler, W. R.; Sophianopoulos, A. J. *Cancer Res* 36(5): 1837-1846; 1976.

The glycoprotein excreted in the urine of a 48-yr-old Caucasian man with acute myelocytic leukemia was isolated to determine its chemical and physical properties, to produce a specific antiserum, and to use the antiserum to study the concentration of the protein in body fluids of other patients. Gel filtration of the urine showed a prominent protein peak with an elution position corresponding to molecular wt of 20,000 to 35,000. The protein (EDC1) was isolated in pure form by sequential gel filtration and ion-exchange chromatography. Its molecular wt was 27,000; it contained 27% carbohydrate and was rich in half-cystine (5% of residues). EDC1 was antigenically and chemically distinct from the recognized glycoproteins of normal plasma. With a specific rabbit antiserum and ^{125}I-EDC1, a radioimmunoassay for the glycoprotein was developed. Both noncancer and cancer plasmas contained immunoreactive material. In noncancer plasma, all the immunoreactivity was eluted from Sephadex G-75 and G-200 in position corresponding to molecular wt of 60,000 to 100,000 (Peak 1). In cancer plasma, an additional peak of immunoreactivity was eluted in the position corresponding to EDC1 (molecular wt 20,000 to 30,000; Peak 2). Of urines from patients without clinical cancer, 86% were nonreactive in radioimmunoassay (< 0.1 μg immunoreactive EDC1/ml); 11 and 3%, respectively, contained immunoreactivity equivalent to 0.1-0.9 and 1-9 μg EDC1/ml, entirely of Peak 1 type. Of urines from patients with disseminated cancer, 91% contained immunoreactivity equivalent to 10-9,999 μg EDC1/ml, primarily of Peak 2 type.

2194 IDIOPATHIC THROMBOCYTOPENIC PURPURA IN LYMPHOMA. (Eng.) Fink, K. (Memorial Hosp., 444 East 68th St., New York, NY 10021); Al-Mondhiry, H. *Cancer* 37(4): 1999-2004; 1976.

Five patients with idiopathic thrombocytopenic purpura (ITP) associated with malignant lymphoma are described, and 12 other cases reported in the literature are reviewed. Thirteen patients (76%) had Hodgkin's disease; two had diffuse histiocytic, one, diffuse mixed, lymphoma. Idiopathic thrombocytopenic purpura presented as the sole clinical manifestation of initial or recurrent lymphoma in 10 of 15 cases (67%). The spleen was not palpable even in patients who showed involvement with lymphoma at splenectomy. Three patients were asplenic at the onset of idiopathic thrombocytopenic purpura. Successful therapy of the thrombocytopenia correlated with effective control of the underlying lymphoma. Splenectomy gave favorable results in 9 of 10 cases (90%) and uncovered occult lymphoma in 5 patients. Chemotherapeutic drugs were successful in 7 of 12 trials (58%), and only when the underlying disease was also controlled. The overall prognosis was related to the status of the lymphoma, and was not altered by the occurrence of the idiopathic thrombocytopenic purpura.

2195 CONGENITAL LEUKEMIA ASSOCIATED WITH MOSAIC TRISOMY 9. (Eng.) Djernes, B. W. (Univ. Cincinnati Coll. Medicine, Cincinnati, Ohio); Soukup, S. W.; Bove, K. E.; Wong, K. Y. *J Pediatr* 88(4): 596-597; 1976.

In the case of a 2-wk-old boy with acute mono-myeloblastic leukemia, there was no gross congenital anomaly although cultured skin fibroblasts evidenced mosaic trisomy 9. Cytogenic studies of the parents and an older brother were normal. There was no history of exposure to radiation, chemicals, drugs, or infections. The chromosomal abnormalities were assumed to have arisen in the zygote or early embryo. It is unlikely that the trisomy 9 arose from the tissue culture. The constitutional chromosome abnormality may have predisposed the infant to leukemia.

2196 ACUTE LYMPHOBLASTIC LEUKEMIA WITH PHILADELPHIA CHROMOSOME: PROBABLE ROLE OF 14-22 TRANSLOCATION. (Fre.) Ayraud, N. (Laboratoire d'Histologie-Embryologie-Cytogenetique, U.E.R. de Medecine, F 06000 Nice, France); Dujardin, P.; Audoly, P. *Nouv Presse Med* 4(42): 3013; 1975.

The case history is presented of a 34-yr-old man with acute lymphoblastic leukemia and with a Philadelphia chromosome (Ph^1). A medullary sample revealed a clone in which the distal end of the long arm of chromosome 22 was translocated to the long arm of chromosome 14. The sample also showed, in addition to a normal clone, a pseudodiploid clone with a 15 monosomy, a 14 trisomy, and a Ph^1. The evidence suggests that the Ph^1 clone corresponds to the chronic phase of leukemia, while the pseudodiploid clone carries the chromosomal mutations that cause the acute phase. Therefore, chronic myeloid leukemia may be a stage that initiates further malignant transformation.

2197 MALIGNANT LYMPHOMAS OF THE SALIVARY GLANDS. REVIEW OF THE LITERATURE AND REPORT OF 33 NEW CASES, INCLUDING FOUR CASES ASSOCIATED WITH THE LYMPHOEPITHELIAL LESION. (Eng.) Hyman, G. A. (Box 221, Presbyterian Hosp., 622 West 168th St., New York, NY 10032); Wolff, M. *Am J Clin Pathol* 65(4): 421-438; 1976.

Malignant lymphomas involving major salivary glands have been reported in 31 cases. To these, 33 new cases were added, 17 of which were studied in detail with regard to clinical presentation, classification (Rappaport), staging (Ann Arbor), therapy, and subsequent course. The parotid gland was involved much more frequently than the submandibular gland. No example of sublingual gland involvement was discovered in the present series. Most of the patients were in the sixth and seventh decades of life. It was noteworthy that all subtypes of lymphosarcoma were encountered, with only a single case of Hodgkin's disease. In four patients, the characteristic histologic picture of lymphoepithelial lesion was found in juxtaposition to malignant lymphoma. The majority of patients received one or more courses of postoperative radiotherapy, which offered the best chance for long-term remission. However, only 40% of patients were free of disease after 2 yr.

2198 CHRONIC GRANULOCYTIC LEUKEMIA WITHOUT THE PHILADELPHIA CHROMOSOME. (Eng.) Canellos, G. P. (Harvard Medical Sch., 35 Binney St., Boston, MA 02115); Whang-Peng, J.; DeVita, V. T. *Am J Clin Pathol* 65(4): 467-470; 1976.

Cytogenetic studies of bone marrow were performed in 230 consecutive cases of patients with chronic granulocytic leukemia (CGL). Twenty patients lacked the Philadelphia (Ph^1) chromosome. All were previously untreated. When compared with Ph^1-positive patients, CGL patients with Ph^1-negative disease had a higher median age (60 compared with 42 yr) and were diagnosed at lower median WBC (75,000) and platelet counts (170,000). Their response to chemotherapy was generally poor, with a median survival of 15 mo compared with 44 mo for the Ph^1-positive group. Four patients survived more than 5 yr and two, more than 10 yr. Thirty-five percent of the Ph^1-negative patients had aneuploid cell lines, of various percentages. Absence of the Ph^1 chromosome in patients with the hematologic characteristics of CGL is a bad prognostic sign.

2199 CHORIORETINAL AND CEREBRAL RETICULOSARCOMA. (Fre.) Owens, G. (Clinique universitaire d'ophtalmologie, Geneva, Switzerland); Babel, J. *Ophthalmologica* 172(2-3): 223-224; 1976.

The case is presented of a 70-yr-old male with a malignant tumor that invaded the brain and the retina and choroid of the right eye; 1 yr earlier, he had a recessive uveitis of the same eye. The lymphoma probably arose from this uveitis. These tumors have been called reticuloendothelial sarcomas, perivascular lymphomas, and microglioma. Cytological examination of the aqueous humor, the vitreous body, and the cerebrospinal fluid allows diagnosis. Irradiation is the recommended therapy.

2200 MULTILAMINAR ENDOPLASMIC RETICULUM AND ABNORMAL MITOSIS IN HODGKIN TUMOR CELLS. (Eng.) Parmley, R. T. (Medical Univ. South Carolina, Charleston, SC 29401); Spicer, S. S.; Garvin, A. J. *Cancer Res* 36(5): 1717-1724; 1976.

A multilaminar alteration of endoplasmic reticulum (ER) was studied in tumor cells of eight patients with Hodgkin's disease and a patient with histiocytic lymphoma. These multilaminar structures were more numerous in dividing cells and thus appeared to arise primarily during mitosis. The stacked membranes in the structures may have resulted from abnormal sticking of organelle membranes, as evidenced by the adherence of ER to other elements of ER, nuclear envelope, mitochondria, or lipid droplets. Multilaminar ER occurred in all mitotic tumor cells, a rare mitotic plasma cell, and numerous interphase Hodgkin cells. The paucity of multilaminar ER in normal mitotic cells and its virtual absence in normal interphase cells suggest that this structure represents a pathological alteration in tumor cells from patients with Hodgkin's disease and histiocytic lymphoma. The multilaminar defect of ER is associated with other atypical features of ER in Hodgkin tumor cells, including the excessive length and curving of ER profiles, the collapse of the ER cisternae, and the overall sparsity of this organelle.

2201 MYCOSIS FUNGOIDES AND ITS RELATIONSHIP TO OTHER MALIGNANT LYMPHOMAS. (Eng.) Thomas, L. B.; Rappaport, H. In: *The Reticuloendothelial System.* International Acad. of Pathology Monograph. (Baltimore: Williams and Wilkins Co.): pp. 243-261; 1975.

A review is presented of the epidemiology, histopathologic and cutaneous features, differential diagnosis, and involvement of extracutaneous organs and tissues of mycosis fungoides, an uncommon neoplastic disease that primarily involves the skin but later often involves the lymph nodes, spleen, and internal organs. The neoplastic cells follow the normal migration pathways of T lymphocytes from which they originate. In the skin, the tumor characteristically involves the upper dermis and often infiltrates the epidermis. Epitheliotrophy may be observed in other organs also, notably the kidneys and the thyroid gland. In the lymph nodes, the tumor preferentially involves the paracortical zone and, in the spleen, the periarteriolar lymphatic sheaths. By light microscopy, many of the neoplastic cells have deeply indented nuclear membranes and a cerebriform nuclear pattern that are helpful in diagnosing the disease and in distinguishing it from Hodgkin's disease and other types of malignant lymphoma.

2202 RETICULOENDOTHELIAL SYSTEM: AN OVERVIEW OF NEOPLASIA. (Eng.) Berard, C. W. In: *The Reticuloendothelial System.* International Acad. of Pathology Monograph. (Baltimore: Williams and Wilkins Co.): pp. 301-317; 1975.

A review is presented of the origins and histology of neoplasms of the reticuloendothelial system, which has two components, the hemopoietic and lymphoreticular systems. Lymphoreticular malignancies may present either as systemic or localized proliferations, the latter being referred to as malignant lymphomas, and observations support the concept that neoplastic lymphoreticular cells of various types may spread anatomically in pathways that mimic the normal migration patterns of their cells of origin. Thus the neoplastic counterparts of lymphocytes, which are naturally noncohesive and mobile, retain their propensity for migration and circulation, so that patients with lymphocytic lymphomas develop peripheral blood involvement more commonly than those with other forms of lymphoma. Nodular (follicular) lymphomas are germinal center neoplasms in which differences in degree of cellular "transformation" and rate of proliferation result in variable cytomorphology and clinical aggressiveness.

2203 INCREASED ERYTHROCYTIC AND NEUTROPHILIC PROGENITORS IN MYELOFIBROSIS WITH MYELOID METAPLASIA.

(Eng.) Ohl, S. (Medical Res. Center, Brookhaven Natl. Lab., Upton, L.I., NY 11973); Carsten, A. L.; Chanana, A. S.; Chikkappa, G.; Cronkite, E. P. *Eur J Cancer* 12(2): 131-135; 1976.

Nucleated blood or bone marrow cells obtained from two male patients (38 and 60 yr old) suffering from myelofibrosis with myeloid metaplasia (MMM) were cultured in diffusion chambers implanted in the peritoneal cavities of x-irradiated mice. The chambers (two/mouse) were placed in the peritoneal cavities of Hale-Stoner-Brookhaven mice that had received a total body x-ray dose of 700 rads 18-24 hr previously. The chambers were reimplanted into newly irradiated hosts on day 7 or 8. At various intervals (2 hr-12 days), groups of six to eight chambers were removed and total and differential cell counts made on the contents. Total cell recovery from MMM blood and marrow cell cultures was similar. The absolute number of neutrophilic cells exhibited two waves of proliferation, during the first of which all forms of neutrophilic granulocytes increased in number. A similar increase was noted in neutrophils during the second wave, with the exception of segmented neutrophils. The ratios of proliferative to nonproliferative cells were 1:4.7 and 1:2.9 during the first and second waves, respectively. The numbers of nucleated erythrocytic cells increased at about day 6 after implantation, and the elevated levels (except the E_1 fraction) persisted for the rest of the observation period. When the distributions of proliferative neutrophilic cells and nucleated erythrocytic cells in MMM, chronic myelocytic leukemia (CML), and normal cell cultures were compared, there was a relative increase in nucleated erythrocytic cells from MMM cultures harvested on days 6 and 10. All three cultures harvested on day 10 had considerable numbers of nucleated erythrocytes, but only 2/6 CML and normal cell cultures contained these cells. These results indicate that MMM patients have increased numbers of erythrocytic and neutrophilic progenitors in their blood and marrow. The observations reported could reflect either a compensatory response to diminished marrow space available for hemopoiesis or a repair response to some injury, such as that seen following sublethal irradiation.

2204 TUMOR CELL CHARACTERIZATION IN MYCOSIS FUNGOIDES.

(Eng.) Robinowitz, B. N. (Cleveland Clinic, 9500 Euclid Ave., Cleveland, OH 44106); Noguchi, S.; Roenigk, H. H., Jr. *Cancer* 37(4): 1747-1753; 1976.

The tumor lesions of five patients with tumor stage mycosis fungoides were excised and examined by light and electron microscopy. The tumor cells were also isolated and the percentages of E rosettes (T cells) and EAC rosettes (B cells) were determined. The rosettes were examined by electron microscopy. The predominant cell type isolated from four of the five tumors was a T cell. Peripheral lymphocyte function measured by lymphocyte transformation to phytohemagglutinin and pokeweed mitogen was normal. Serum immunoglobulins gave variable results. The results support the concept that mycosis fungoides is primarily a T-cell tumor involving the skin, and morphologically similar to the Sezary cell.

2205 QUANTITATIVE ANALYSIS ON ULTRASTRUCTURE OF TUMOR CELLS IN TISSUE CULTURE.

(Eng.) Yagubov, A. S. (P. A. Gertsen Moscow Oncologic Res. Inst., Moscow, USSR). *Bull Exp Biol Med* 80(10): 1241-1243; 1975.

A comparative morphometric analysis was made of the ultrastructure of primary trypsinized tumors of rat reticulosarcoma 321 (KRS-321), hamster sarcoma induced by human adenovirus of serotype 12 (SKhA-12), and cells of lines EHp-2 and CaVe. In both primary and transplantable tumor cultures, considerable differences were found in the structural organization of the different strains that affected their energy-forming and protein-synthesizing systems. Primary cultures also had a more reduced ergastoplasm and a highly developed polysome system. It is suggested that in vitro cultivation contributed to the reconstruction of the protein-synthesizing systems toward synthesis of substrates needed for culture growth.

2206 FINE STRUCTURE AND ORIGIN OF KAPOSI'S SARCOMA.

(Eng.) Gokel, J. M. (Dept. Pathology, Univ. Munich, D-8 Munchen 2, Thalkirchner Strasse 36, Munich, W. Germany); Kuerzl, R.; Huebner, G. *Pathol Eur* 11(1): 45-47; 1976.

Tumor cells in Kaposi's sarcoma with visceral involvement were studied by fine structural analysis. In the cytoplasm of these cells rod-shaped tubulated bodies resembling Weibel-Palade granules could be demonstrated. This finding and the occurrence of a basement membrane around the tumor cells characterize Kaposi cells as endothelial cells of blood vessels that may originate from undifferentiated vasoformative cells of the adventitia. These results are in contrast to previous findings that suggested Schwann cells as the origin of the sarcoma.

2207 METASTATIC CYSTOSARCOMA PHYLLODES: A LIGHT AND ELECTRON MICROSCOPIC STUDY.

(Eng.) Fernandez, B. B. (Lutheran General Hosp., 1775 Dempster St., Park Ridge, IL 60068); Hernandez, F. J.; Spindler, W. *Cancer* 37(4): 1736-1747; 1976.

Two cases of metastatic cystosarcoma phyllodes, one in the lung of a 60-yr-old woman and the other in the axillary lymph nodes of a 50-yr-old woman, were studied with the light and electron microscopes. The malignant element of these tumors appeared to be a poorly differentiated mesenchymal cell. No evidence supporting the presence of epithelial cells was found. The tumor metastatic to the axilla exhibited intracellular viruslike particles similar to those described in adenocarcinoma of breast and other sarcomas.

2208 GRANULAR CELL SARCOMA OF ENDOMETRIUM.

(Eng.) Kazzaz, B. A. (Leyenburg Hosp., The Hague, The Netherlands). *Eur J Obstet Gynecol Reprod Bio* (5/4): 233-237; 1975.

An unusual endometrial stromal sarcoma in a 69-yr-old woman was diagnosed by curettage and subsequently confirmed by hysterectomy. The tumor cells were characterized by coarse acidophilic and phloxinophilic intracytoplasmic granules. It is suggested that this tumor is a derivative of the specific granular 'K' cells of the endometrial stroma and that granular stromal sarcoma is an appropriate name for this tumor.

2209 GERM-CELL TUMORS OF THE MEDIASTINUM, POSTMORTEM FINDINGS.

(Eng.) Luna, M. A. (M.D. Anderson Hosp. and Tumor Inst., Houston, TX 77025); Valenzuela-Tamariz, J. *Am J Clin Pathol* 65(4): 450-454; 1976.

Autopsy findings in 20 cases of clinical extragonadal germ-cell tumors arising in the anterior mediastinum are presented. The histologic types were: two choriocarcinomas, three seminomas, three malignant teratomas three embryonal carcinomas, and nine mixed germ-cell tumors. All patients were men, aged 14 to 45 yr, with a mean of 32.5 yr. The mean survival after diagnosis was 10.9 mo. Local recurrence was characteristic of nonseminomatous tumors. In patients with seminoma, local control of the disease was good, but distant metastases were the cause of death. The most frequent sites of metastases were lungs, bones, and liver. In all 20 cases, the testes were carefully step-sectioned. Occult tumor was found in only one case of embryonal carcinoma, and the only other testicular abnormality was a well-defined testicular scar with calcification in a patient with choriocarcinoma. Both patients had lower retroperitoneal metastases. These findings support the premise that these tumors had a primary extragonadal origin in the majority of cases.

2210 CASE REPORT: A CARCINOID OCCURRING IN THE TESTIS.

(Eng.) Wurster, K. (Inst. Pathology and Pathologic Anatomy, Univ. Heidelberg, Im Neuenheimer Feld 220-221, D-6900 Heidelberg, W. Germany); Brodner, O.; Rossner, J. A.; Grube, D. *Virchows Arch* [*Pathol Anat*] 370(2): 185-192; 1976.

Carcinoids of the testis develop in three different ways: a) they may differentiate within a teratoma; b) they may be metastases of a ''loco alieno'' seated carcinoid, and c) they may represent real primary carcinoids. Electron microscopic and fluorescence microscopic examination of the case subject showed that it corresponds to the carcinoids of the lower small gut. According to the specific ultrastructure of the intracytoplasmic granules, it must derive histogenetically from an endocrine cell. This primary testicular carcinoid represents either an autochthonous tumor of the male gonad or solely a teratoma with one-sided differentiation in the sense of a simplified teratoma.

2211 FAMILIAL MALE BREAST CANCER.

(Eng.) Everson, R. B. (Natl. Cancer Inst., A-521 Landow Bldg., Bethesda, MD 20014); Fraumeni, J. F., Jr.; Wilson, R. E.; Li, F. P.; Fishman, J.; Stout, D.; Norris, H. J. *Lancet* 1(7949): 9-12; 1976.

Infiltrating ductal carcinoma of the breast occurred in a total of six men from two families. In one family, specimens from three men who had prophylactic mastectomies revealed focal intraductal hyperplasia, suggesting a familial tendency toward proliferation of mammary-duct epithelium. In the other family, benign and malignant breast lesions also developed in several women. Preliminary data suggest elevated urinary estrogen excretion in three men from these families, implying a defect in estrogen production or metabolism in the pathogenesis of male breast neoplasms.

2212 ESTROGEN RECEPTOR PROTEIN IN LESIONS OF THE MALE BREAST: A PRELIMINARY REPORT.

(Eng.) Rosen, P. P. (Memorial Sloan-Kettering Cancer Center, 1275 York Ave., New York, NY 10021); Menendez-Botet, C. J.; Nisselbaum, J. S.; Schwartz, M. K.; Urban, J. A. *Cancer* 37(4): 1866-1868; 1976.

Eleven specimens of breast lesions obtained from 10 male patients were analyzed for estrogen receptor protein (ERP). Three patients (ages 49, 77, and 82 yr) had infiltrating duct carcinomas with no axillary metastases. ERP in each of these was positive. Eight specimens with gynecomastia, one of which was obtained from the 77-yr-old patient with carcinoma in the same breast, were also analyzed. Of these, ERP was positive in a 59-yr-old man who had cirrhosis of the liver; two patients with borderline ERP had hepatitis and testicular seminoma, respectively. No relationship between histopathologic features of the lesions and ERP results was found. Review of available literature, including these cases, revealed that six of eight male breast carcinomas were ERP-positive.

2213 DOES THE MALIGNANCY OF BREAST CANCER VARY WITH AGE?

(Eng.) Stoll, B. A. (Dept. Radiotherapy and Oncology, St. Thomas' Hosp., London, England). *Clin Oncol* 2(1): 73-80; 1976.

Available information concerning the relationship of age of breast cancer patients at presentation to subsequent prognosis is summarized. The pattern of metastasis was found to vary with age: of 755 women who showed evidence (before death) of recurrence of metastasis after primary treatment, 55% of those aged 40 or less at treatment had a ''shower of metastases'' in which at least two of the three major sites of recurrence or metastasis (local, osseous, or visceral) became involved in rapid succession. The proportion of recurrences taking the aggressive ''shower'' form decreased progressively in each decade thereafter until in women over the age of 70 it represented 25% of all cases. The localization of metastases is also influenced by age: after radical treatment of Stage I cases, initial skeletal metastases were twice as common in women under the age of 60 as in those over 60. The recurrence-free interval may be prolonged when menopause intervenes after primary treatment: of 409 women who presented when under the age of 59, 80% of those in whom menopause occurred subsequent to primary treatment were recurrence-free after 3 yr, in marked contrast to only 8% of those whose ovaries remained active.

2214 STRUMAL CARCINOID OF THE OVARY. (Eng.) Ranchod, M. (Stanford Univ. Medical Center, Stanford, CA 94305); Kempson, R. L.; Dorgeloh, J. R. *Cancer* 37(4): 1913-1922; 1976.

On ultrastructural examination, the cells in the solid parts, as well as in the ''follicular'' areas, of the apparently nonfunctioning strumal carcinoid ovarian tumor of a 45-yr-old woman, contained dense-core secretory granules, indicating that this is a pure carcinoid tumor. The thyroidlike appearance in areas was due to the accumulation of secretory material within unusually dilated acinar spaces. Because the cells forming the folliclelike spaces in this tumor contained dense-core granules, the question of whether or not any strumal carcinoid contains thyroid tissue is raised.

2215 GENITAL CYTOLOGIC ABNORMALITIES IN PATIENTS HAVING THERAPEUTIC ABORTION. (Eng.) Creasman, W. T. (P.O. Box 3079, Duke Medical Center, Durham, NC 27710); Rock, J. A.; Christakos, A. C.; Parker, R. T. *South Med J* 69(2): 199-200; 1976.

Of 1,032 patients who presented for abortion at the Duke University Medical Center from 1971 to 1973, 99 (9.59%) had abnormal cervical cells detected by routine preabortion Papanicolaou smears. The average age of the patients was 23.1 yr, with a range of 14-41 yr. These findings suggest that the patient who presents for therapeutic abortion is at a high risk for early cervical neoplasia. Therefore, it is mandatory that evaluation of the preabortion patient include adequate genital cytologic studies with means for proper follow-up.

2216 ORIGIN OF ESTROGEN IN A POSTMENOPAUSAL WOMAN WITH A NONENDOCRINE TUMOR OF THE OVARY AND ENDOMETRIAL HYPERPLASIA. (Eng.) MacDonald, P. C. (Univ. Texas Southwestern Medical Sch., 5323 Harry Hines Blvd., Dallas, TX 75235); Grodin, J. M.; Edman, C. D.; Vellios, F.; Siiteri, P. K. *Obstet Gynecol* 47(6): 644-650; 1976.

The origin and quantity of estrogen and androgen were measured in a 57-yr-old postmenopausal woman with clinical signs of estrogen excess and a nonendocrine tumor of the ovary. The plasma androstenedione production rate was elevated fivefold. The estrone production rate was also five times that normally expected for a postmenopausal woman and could be accounted for totally by the extraglandular conversion of plasma androstenedione. Following removal of the tumor, the concentration of plasma androstenedione and the estrone production rate fell dramatically to normal postmenopausal levels. It is concluded that this markedly increased androstenedione production was the result of excessive secretion of androstenedione by the hyperplastic stromal cells of the ovary containing the mucinous cystadenocarcinoma. The excessive prehormone production together with its normal extraglandular conversion to estrone resulted in the massive increase in endogenous estrogen formation. The ultimate androgenic or estrogenic clinical expression of these tumors is probably dependent on the androstenedione production, the efficiency of its conversion to estrogen, and the secretion of testosterone.

2217 OVARIAN TUMORS IN PEUTZ-JEGHERS SYNDROME. (Fre.) Netter, A. L. (Hopital Necker, 149, rue de Sevres, F 75730 Paris Cedex 15, France); Netter, A.; Berger, C.; Lanacs, J.; Lecomte, P. *Nouv Presse Med* 4(45): 3181-3182; 1975.

Each of two females (21 and 26 yr) with Peutz-Jeghers syndrome (PJS) had, in addition to the intestinal polyps and other general traits of the syndrome, an ovarian tumor described as a tumor of the sex tractus with annular tubules. It is proposed that such ovarian tumors, which probably arise from a hamartoma of the same titer as the intestinal polyps, are characteristic of PJS. An embryological explanation of the symptoms of the syndrome is yet to be found. No analogous lesion of the testicles has been described in a PJS case even though testicles and ovaries have the same embryological origin. In PJS cases, the ovaries should be thoroughly examined for these tumors, and if such a tumor is found by itself, PJS should then be suspected.

2218 CYTOLOGIC FINDINGS IN STILBESTROL EXPOSED FEMALES WITH EMPHASIS ON DETECTION OF VAGINAL ADENOSIS. (Eng.) Hart, W. R. (Univ. Michigan Medical Sch., 1335 E. Catherine St., Ann Arbor, MI 48104); Zaharov, I.; Kaplan, B. J.; Townsend, D. E.; Aldrich, J. O.; Henderson, B. E.; Roy, M.; Benton, B. *Acta Cytol (Baltimore)* 20(1): 7-14; 1976.

A prospective study of 271 females believed to have had prenatal exposure to diethylstilbestrol documents the cytologic findings in separate vaginal and cervical preparations. In 233 patients, direct circumferential scrapings of the upper vaginal wall were taken after potentially contaminating mucous secretions had been removed. Cellular evidence of vaginal adenosis was observed in 105 (45%) of the patients as determined by the identification of columnar cells and/or metaplastic squamous cells in the vaginal samples. Columnar cells were observed in 87 (37%) of the 233 patients. Metaplastic squamous cells accompanied the columnar cells in 54 cases. In an additional 18 patients (8%) metaplastic squamous cells were the only cytologic evidence of adenosis. Similar cellular changes were observed in 88% of the vaginal samples from 25 patients with biopsy-proven vaginal adenosis. Malignant cells were not found in any of the cytologic or histologic specimens. Dysplastic squamous cells, however, were present in cytosmears from four patients. Biopsies from two of these patients confirmed the diagnosis of squamous dysplasia. Dysplasia also was identified by biopsy in four others. Cytology appears to be valuable in the evaluation of patients with a history of intrauterine exposure to stilbestrol. Vaginal adenosis as well as neoplastic and dysplastic lesions can be reflected in properly obtained cellular specimens.

2219 PITUITARY THYROTROPIC TUMOUR SECONDARY TO LONG-STANDING PRIMARY HYPOTHYROIDISM. (Eng.) Leong, A. S. Y. (Dept. Pathology, Univ. Malaya, Kuala Lumpur, Malaysia); Cawla, J. C.; Teh, E.-C. *Pathol Eur* 11(1): 49-55; 1976.

A 26-yr-old woman with untreated primary hypothyroidism developed a pituitary tumor that produced bitemporal hemianopsia. Histochemical and ultrastructural studies characterized the tumor cells as thyrotrops. The secretory granules present had a mean diameter of 110 µm and were membrane-bound and surrounded by clear halos. Many of the tumor cells were actively secreting. They had reduced numbers of granules and possessed expanded Golgi complexes, abundant rough endoplasmic reticulum, and free ribosomes. Cytoplasmic microfilaments were also seen. It is suggested that the lack of thyroid feedback inhibition of the pituitary centers regulating the release of thyrotropin may have been responsible for the development of the adenoma.

2220 SALIVARY EPITHELIAL CELLS IN PRIMARY CULTURE: CHARACTERIZATION OF THEIR GROWTH AND FUNCTIONAL PROPERTIES. (Eng.) Wigley, C. B. (Inst. Cancer Res., Nightingales Lane, Chalfont St. Giles, Bucks., England); Franks, L. M. *J Cell Sci* 20(1): 149-165; 1976.

Adult male C57/BL/Icrf a(t) mouse submandibular salivary gland cells were grown in primary explant culture. After an initial period of degeneration within the explant, during which time acinar cells were lost, surviving epithelial cells proliferated rapidly. These cells, which were low columnar or cuboidal in shape and were frequently organized into ducts or ribbons of cells, recolonized the degenerate explant. Autoradiographic studies showed that a peak of DNA synthesis occurred after 4 days in vitro and that proliferation was enhanced by insulin and hydrocortisone but sex steroids of thyroid hormones had no effect. The cells retained specialized secretory function (protease activity) for at least 2 wk in vitro. This enzyme is a differentiated product of granular tubule cells in vivo. Between 6 and 10 days, explants attached to the substrate. An outgrowth developed, consisting largely of ultrastructurally identifiable epithelial cells that formed pseudoglandular structures in the monolayer. Epithelium survived for over 6 mo in primary culture but could not be serially transferred. Secondary cultures were rapidly overgrown by mesenchymal cells.

2221 ANIMAL MODEL: MEDULLARY CARCINOMA OF THE THYROID IN THE RAT. (Eng.) Boorman, G. A. (California Primate Res. Center, Univ. California, Davis, CA 95616); Hollander, C. F. *Am J Pathol* 83(1): 237-240; 1976.

Studies have indicated that a naturally occurring thyroid tumor is present in 16%-40% of many strains of rats, including Long-Evans, Sprague-Dawley, Wistar, and wild rats. The affected rats are usually over 18 mo old. The tumors are of C cell origin, metastasize via the lymphatic system and usually affect the deep cervical nodes first. The tumor is similar to thyroid medullary carcinoma in humans in origin, morphological features, method of metastasis, age of occurrence, and calcitonin secretion. Histaminase and serotonin secretion have not been studied in the rat. However, unlike thyroid carcinoma in man, amyloid is only found in a low percentage of tumors, there is no known association with other endocrine abnormalities, and diarrhea is not reported.

2222 PIGMENTED ADENOMA OF ADRENAL CORTEX ASSOCIATED WITH CUSHING'S SYNDROME. LIGHT AND ELECTRON MICROSCOPIC STUDY. (Eng.) Kovacs, K. (St. Michael's Hosp., Univ. Toronto, Toronto, Ontario, Canada); Horvath, E.; Feldman, P. S. *Urology* 7(6): 641-645; 1976.

A pigmented adenoma of the adrenal cortex was surgically removed from a 39-yr-old woman with clinical and biochemical manifestations of Cushing's syndrome. Light and electron microscopic study revealed numerous pigment granules exhibiting the structural features of lipofuscin in the cytoplasm of the adenoma cells. It appears that adrenocortical adenomas with excessive pigment deposition can be accompanied by increased production of corticosteroid hormones. It is not known what caused the accumulation of lipofuscin, but it appears that the mitochondria may have gradually changed into lipid droplets, as was previously reported to have occurred in the rat.

2223 THE PREDICTION OF LYMPH NODE METASTASES FROM ORAL SQUAMOUS CARCINOMA. (Eng.) Shear, M. (Dept. Oral Pathology, Univ. of the Witwatersrand, Jan Smuts Ave., Johannesburg 2001 South Africa); Hawkins, D. M.; Farr, H. W. *Cancer* 37(4): 1901-1907; 1976.

In an attempt to predict which cases of oral and oropharyngeal squamous carcinoma are likely to metastasize to regional lymph nodes, 898 cases were grouped according to site, size, grade of histological differentiation, and presence or absence of histologically confirmed regional lymph node metastases. The results were analyzed by a logistic multiple regression analysis. They showed that the sites may be divided into three clusters. Cluster 1 consisted of tumors of lip, floor of mouth, cheek mucosa, hard palate, and gingiva. These were not significantly different in metastasis rate. Cluster 2 consisted of tumors of the anterior two-thirds of tongue, and had a higher tendency to metastasis than those in Cluster 1. Lesions of the posterior third of tongue and oropharynx formed Cluster 3, which exhibited the greatest tendency to metastasis. Sizes of primary lesions were clustered in groups of lesions less than 3 cm, those 3 to less than 4 cm, and those 4 cm or larger, in ascending tendency to metastasis. Well-differentiated and moderately differentiated tumors were not significantly different in their tendency to metastasize, and were reduced to a single cluster, whereas poorly differentiated tumors had a markedly higher metastasis rate. Using these clusters, it was possible to predict the logistically transformed probability of metastasis to a high degree of accuracy (R = 0.9398). It is concluded that if the site, size, or differentiation cluster to which a given tumor belongs is known, the probability of its metastasizing can be estimated.

2224 SMALL CELL UNDIFFERENTIATED CARCINOMA OF SALIVARY GLAND ORIGIN: AN ULTRASTRUCTURAL STUDY. (Eng.) Wirman, J. A. (Northwestern Univ. McGaw Medical Center, Chicago, IL); Battifora, H. A. *Cancer* 37(4): 1840-1848; 1976.

A case of small cell carcinoma of the salivary gland in a 23-yr-old man was studied by light and electron microscopy. Light microscopy showed sheets of small uniform cells with scanty cytoplasm and pyknotic nuclei. Electron microscopy showed two distinct cell types: an electron-lucent epithelial-appearing cell, and a denser cell with processes containing bundles of filaments and other features suggesting myoepithelial differentiation. Neurosecretory granules were absent. These findings support a salivary duct origin and are evidence against a neurendocrine derivation for this tumor.

2225 NEOPLASTIC TRACHEOESOPHAGEAL FISTULA IN A WOMAN WITH ESOPHAGEAL STENOSIS DUE TO CAUSTIC SUBSTANCES. (Fre.) Scala, G. (Hopital general regional A. Cardarelli, Naples, Italy); Chiummariello, A.; Palumbo, U. *Bronches* 25(4): 256-260; 1975.

Twenty-seven yr after ingestion of a caustic substance, a 43-yr-old woman with an ensuing and hitherto well-controlled esophageal stenosis developed a tracheoesophageal fistula of the nature of an epidermoid cancer. The primary lesion probably arose from the esophageal stenosis.

2226 ABNORMAL SERUM LACTATE DEHYDROGENASE ISOENZYME IN A CASE OF LARYNGEAL CARCINOMA AND THYROTOXICOSIS. (Eng.) Tanaka, F. (Osaka Univ. Hosp., 1-1-50, Fukushima, Fukushima-Ku, Osaka 553, Japan); Amino, N.; Hayashi, C.; Miyai, K.; Kumahara, Y. *Clin Chim Acta* 68(3): 235-240; 1976.

A case history of a 55-yr-old man with laryngeal carcinoma and hyperthyroidism is presented. Upon electrophoresis of the patient's serum, an abnormal lactate dehydrogenase (LDH) isoenzyme was found between LDH-1 and LDH-2. The molecule possessed a high molecular wt and was stable at 56 C for 30 min. It disappeared with the removal of the cancer tissue, but a relationship with the thyrotoxic state cannot be excluded.

2227 ORGAN CULTURE OF ADULT RAT AND MOUSE TRACHEAL EPITHELIUM: I. ULTRASTRUCTURE FOLLOWING VARIOUS CULTURE PERIODS. (Eng.) Pavelka, M. (Dept. Micromorphology and Electron Microscopy, Univ. Vienna, Schwarzpanierstrasse 17, A-1090 Vienna, Austria). *Cell Tissue Res* 165(3): 371-382; 1976.

A report is presented of electron microscopic studies of the epithelial cells in 2 mm tracheal sections dissected from adult Sprague-Dawley rats and adult albino mice and maintained in organ culture for periods of up to 6 days. In specimens cultured for 60 min, no conspicuous morphological alterations were observed. Specimens maintained for periods up to 4 days demonstrated good preservation of the ultrastructural details of the different epithelial cells, although a reduction in the number of cilia in some of the ciliated cells was evident. In specimens cultured for 5 to 6 days, some additional alterations were noticed: polymorphism of mitochondria, an increased number of lysosomes, appearance of intracellular vacuoles, exhaustion of goblet cells, and disappearance of granulated mast cell-like cells in the rat tracheal epithelium. This study may serve as a baseline for further ultrastructural investigations of cultured tracheal epithelia, such as investigations of response to carcinogens.

2228 HEPATOMA INDUCED BY THORIUM DIOXIDE. (Eng.) Mann, N. S. (Dept. Medicine, 800 Zorn Ave., Louisville, KY 40202); Chaudhry, A.; Thaler, S.; Sachdev, A. *South Med J* 69(4): 510-512; 1976.

Twenty-six years after injection of Thorotrast, a 74-yr-old man presented with complaints of anorexia and weight loss. Tests revealed an elevated alkaline phosphatase level; jaundice and ascites were not present. A biopsy revealed thorium dioxide granules in the liver and periportal fibrosis. A hepatoma of the left lobe of the liver was discovered upon laparotomy. It is suggested that in patients with a history of previous injection of Thorotrast and abnormal liver function, hepatic malignancy should be suspected.

2229 PERIPHERAL PULMONARY CARCINOID TUMORS. (Eng.) Bonikos, D. S. (Stanford Univ. Sch. Medicine, Stanford, CA 94305); Bensch, K. G.; Jamplis, R. W. *Cancer* 37(4): 1977-1998; 1976.

The light microscopic and ultrastructural features of five asymptomatic peripheral carcinoids presented as distinct pulmonary solitary nodules are described. By conventional microscopy the tumors displayed a variety of histologic patterns. The most unusual one showed tumor cells embedded in a richly vascular hyalinized stroma and forming papillary structures or cystic spaces lined by low cuboidal cells, which ultrastructurally bore a strong resemblance to intermediate or transitional forms between types I and II pneumocytes. A striking feature of these tumors was their rich vasculature, associated with a marked perivascular sclerosis composed of basement membranelike material and collagen fibrils, which were probably produced by the increased numbers of pericytes surrounding these sclerotic vessels. Literature concerning these tumors is reviewed, and the clinical implications, biologic behavior, and association with other pulmonary neoplasms of these carcinoids, are discussed.

2230 DIAGNOSTIC AND THERAPEUTIC CHALLENGES FOLLOWING THE CYTOLOGIC DIAGNOSIS OF IN SITU CARCINOMA OF THE LUNG. (Eng.) Tyers, G. F. O. (Hershey Medical Center, Hershey, PA 17033); McGavran, M. H. *Chest* 69(1): 33-38; 1976.

Clinical challenges associated with the cytologic detection of eight cases of occult pulmonary carcinoma are presented. The pulmonary lesions were successfully localized and resected in three of six cases encountered since the availability of flexible fiberoptic bronchoscopy and selective bronchial brushing. Two of the resected neoplasms were unequivocally in situ, while preoperative radiotherapy precluded accurate pathologic determination of invasiveness in the third. The reported experience with unequivocal in situ bronchogenic carcinoma localized and treated surgically prior to invasion through the basement membrane now totals 17 cases (15 previously reported). Forty-four additional cases (43 previously reported) have been localized and resected following early invasion. From this group totaling 61 occult carcinomas, only 2 patients (3%) are known to have died of pulmonary carcinoma during a followup ranging from 2 to 20 yr. Radiation therapy is not recommended for this type of cancer.

2231 SO-CALLED ''MINUTE PULMONARY CHEMODECTOMA'': A TUMOR NOT RELATED TO PARAGANGLIOMAS.(Eng.) Churg, A. M. (Dept. Pathology, Univ. Chicago, 950 E. 59th St., Chicago, IL 60637); Warnock, M. L. *Cancer* 37(4): 1759-1769; 1976.

Twenty-six cases of so-called ''minute pulmonary chemodectoma'', of which 22 were female, are presented. There appeared to be an association of the lesion with pulmonary injury from a variety of causes, including cardiac failure, chronic bronchitis and emphysema, and thromboemboli. Half the cases had multiple tumors. Microscopically, the tumors consisted of nests of cells in the interstitial tissue near small veins. Argentaffin and argyrophil stains failed to demonstrate cytoplasmic granules in any case. By electron microscopy, the nests were seen to be composed of large cells with broadly interdigitating processes connected by many well-formed desmosomes. The cytoplasm was filled with numerous 60-A filaments. The Golgi apparatus was prominent, but other organelles were sparse. No secretory granules were identified. The fine structure and lack of silver-positive granules are inconsistent with the morphology of previously reported paragangliomas, but there is a resemblance at the light and electron microscopic level to meningeal arachnoid cells and the cells of meningiomas.

2232 ULTRASTRUCTURAL CHANGES IN LIVERS OF TUMOUR BEARING RATS. (Eng.) Bhawan, J. (Univ. Massachusetts Medical Sch., Worcester, MA); Friedell, G. H.; Jacobs, J. B. *Br J Exp Pathol* 56(6): 561-569; 1975.

The histological and ultrastructural changes in the livers of rats bearing transplanted mammary carcinomata from 4-12 wk after transplantation were studied. Changes occurred mainly in cytoplasmic structure of the hepatocytes. The significant findings were pleomorphism of mitochondria, the presence of a large number of myelin figures, a marked increase in microbodies, dilatation of rough endoplasmic reticulum, proliferation of smooth endoplasmic reticulum, intracytoplasmic cholesterol clefts, and an absence of increase in lysosomes. Centrioles in Kupffer cells were described for the first time.

2233 INTRACYTOPLASMIC HYALINE GLOBULES IN HEPATOCELLULAR CARCINOMAS. (Eng.) Cohen, C. (Sch. Pathology, Johannesburg, South Africa). *Cancer* 37(4): 1754-1758; 1976.

Intracytoplasmic hyaline globules (IHG) were found in 16 out of 105 hepatocellular carcinomas (15.2%). In these cases, there was a male preponderance, most of the patients were black, and the mean age was in the fifth decade. IHG were noted mostly in the better-differentiated tumors. Bile production was present in 12% of all tumors. Over 80% of tumors with globules showed necrosis, compared with 40% of the tumors without globules. Cirrhosis was present in almost half the cases, with liver cell dysplasia in 15%. Five of 12 patients with raised serum α-fetoprotein had IHG in their carcinomas.

2234 IS INTESTINAL METAPLASIA OF THE GASTRIC MUCOSA A PRE-MALIGNANT LESION? (Eng.) Reynolds, K. W. (Charing Cross Hosp., London, England); Johnson, A. G.; Fox, B. *Clin Oncol* 1(2): 101-109; 1975.

The relationship between intestinal metaplasia and gastric carcinoma is discussed in terms of an examination of standard sections from 100 gastrectomy specimens, 50 of which were resections for benign gastric ulcer of the lesser curvature and 50 for carcinoma. Intestinal metaplasia was observed in 31/50 benign ulcer cases and in 40/50 carcinoma specimens. In 30/35 cases of intestinal type carcinoma, metaplasia was observed, and it was seen in 5/7 cases of diffuse carcinoma and in 5/8 cases of a mixed intestinal and diffuse type. In some specimens metaplasia was observed immediately adjacent to the carcinoma and blending into it. An increased incidence of carcinoma has been reported in cases of intestinal metaplasia. With experienced observers, it can be recognized endoscopically, appearing as a pale area of mucosa where the vessels are well seen, particularly if these areas are patchy and interspersed with raised reddened mucosa of active, deep, chronic gastritis. Etiologic theories are discussed and recommended surgical management is outlined. Although the evidence is not yet conclusive, it is strong enough, coupled with the potential danger, to justify a definite policy of selective surgical treatment.

2235 NEOPLASIA OF THE COLON: A LATE COMPLICATION OF URETEROSIGMOIDOSTOMY. (Eng.)

Lindsey, C. M. (Box 3101, Duke Univ. Medical Center, Durham, NC 27710); Anderson, E. E.; Paulson, D. F. *South Med J* 69(4): 501-504; 1976.

The case history is presented of a 34-yr-old man who developed carcinoma of the sigmoid colon 26 yr after ureterosigmoidostomy for a benign condition. To date, 31 cases of neoplasia complicating ureterosigmoid diversion have been reported. Although the carcinogenicity of urine and an alteration of local tissue dynamics are possible etiologic mechanisms, a more likely one is a decrease in the amount of sigmoid mucus, leading to irritation of the area of anastomosis by fecal material. The low incidence of neoplasia following ureterosigmoidostomy does not warrant abandoning the procedure, but the patients should be followed throughout life for subsequent malignancy.

2236 PERFORATED AND PLUGGED ULCER AFTER MALIGNANT TRANSFORMATION. (Fre.)

Guntz, M. (Service de Chirurgie Generale, Centre Hospitalier Universitaire d'Angers, avenue de l'Hopital, 49036 Angers, France); Billabert, D.; Albaret, P.; Francois, H. *Sem Hop Paris* 50(41): 2503-2506; 1974.

A perforated malignant ulcer was excised from the pylorus of a 74-yr-old male. Clinical, radiological, and histological studies indicated that it was not an ulcerous cancer but an ulcer that had degenerated into a cancer. The patient had suffered for 18 yr from a typical, well-controlled ulcer that had recently evolved and become perforated. Although the evolution of the ulcer was not followed, radiographs showed a gastric cancer corresponding to an already symptomatically modified ulcer. Pathological examination showed the existence of both benign and malignant lesions.

2237 PAPILLOMA OF THE GALLBLADDER. (Eng.)

Aoki, Y. (Izumiohtsu City Hosp., Izumiohtsu, Osaka 595, Japan); Okamura, T.; Kurimoto, H.; Taniguchi, K. *Am J Surg* 131(5): 614-617; 1976.

A case history of a 31-yr-old woman with papilloma of the gallbladder is reported. The gallbladder was associated with cholesterosis but not with stones. The colicky pain in this case was probably caused by blood clots resulting from bleeding of the papilloma or possibly by small pieces of the papilloma breaking off into the common bile duct. Papillomas of the gallbladder exhibit no characteristic clinical picture; the symptoms are similar to those of any type of gallbladder disease. These papillomas may be associated with malignant degeneration. Cholecystectomy is the treatment of choice.

2238 THE EXFOLIATING CERVICAL EPITHELIAL SURFACE IN DYSPLASIA, CARCINOMA IN SITU AND INVASIVE SQUAMOUS CARCINOMA. I. SCANNING ELECTRON MICROSCOPIC STUDY. (Eng.)

Rubio, C. A. (Inst. Pathology, Karolinska sjukhuset, Stockholm, Sweden); Kranz, I. *Acta Cytol* 20(2): 144-150; 1976.

The exfoliating epithelial surface in cone specimens taken from five normal subjects, four patients with squamous metaplasia, four with dysplasia, five with carcinoma in situ, and two with invasive squamous carcinoma was examined with the scanning electron microscope. Epithelial surface covered by microrughae was found not only in normal squamous epithelium but also in dysplasia. In dysplasia, only fragments of microrughae were observed, intermingled with abnormal microvillilike formations. Squamous metaplasia was characterized by a mosaic arrangement of the cells, covered by microvilli. Carcinoma in situ was characterized by the presence of altered microvillilike formations. Bizarre deformity of microvilli was associated with the presence of invasive squamous carcinoma. The presence of irregular microvilli in cobblestonelike epithelial surfaces of the uterine cervix indicates that malignant cells have reached the exfoliating surface of the epithelium.

2239 ULTRASTRUCTURE OF HEMANGIOPERICYTOMA ASSOCIATED WITH PARANEOPLASTIC HYPOGLYCEMIA. (Eng.)

Bommer, G. (Patholog. Inst. d. Krankenhauses Eppendorf, Martinistrasse 52, D-2000 Hamburg 20, W. Germany); Altenaehr, E.; Kuehnau, J., Jr.; Kloeppel, G. *Z Krebsforsch Klin Onkol* 85(3): 231-241; 1976.

A recurred and metastasized hemangiopericytoma of meningeal origin caused a terminal hypoglycemia syndrome in a 40-yr-old man. The disease had been observed over a period of 10 yr. The total weight of the tumor metastases was 1800 g. Electron microscopic examination of the tumor cells revealed, in particular, a markedly developed ergastoplasm, prominent Golgi complexes surrounded by many microvesicles, round to ovoid electron dense bodies, and fine fibrillar structures. Furthermore, large deposits of basement membrane-resembling material were found in the pericapillary and intercellular spaces. On the basis of the structural characteristics, an excessive glucose consumption by the tumor is suggested to be an important factor in the pathogenesis of tumor hypoglycemia. The question of whether the ultrastructure of the tumor also exhibits secretory processes, which may be related to the release of a presumed inhibitor of hepatic gluconeogenesis and/or glycogenolysis, remains open. Typical granules as in polypeptide hormone secreting cells were not observed. It is possible that the electron dense membrane-limited bodies were immature secretory granules, but they also could have been lysosomes.

2240 GRANULAR CELL TUMORS OF THE HEART. (Eng.) Fenoglio, J. J., Jr. (Armed Forces Inst. Pathology, Washington, DC 20306); McAllister, H. A., Jr. *Arch Pathol Lab Med* 100(5): 276-278; 1976.

Granular cell tumors arising in the hearts of three patients were studied histologically, and one was studied ultrastructurally, to determine their origin. No evidence was found to support the hypothesis that these tumors are derived from striated muscle or cardiac muscle. The anatomic location of the tumors in all three cases (on the epicardia or in the atria) suggests that granular cell tumors are derived from Schwann cells or from the same precursor cell as the Schwann cell.

2241 CONGENITAL SUBGLOTTIC FIBROMA IN THE NEWBORN. (Eng.) Tsui, H. N. (State Univ. New York Sch. Medicine, 2121 Main St., Buffalo, NY 14214); Lore, J. M., Jr. *Laryngoscope* 86(4): 571-576; 1976.

A case history of a 6-day-old boy with a congenital subglottic fibroma is reported. Such an abnormality is a result of a defect in the development of the sixth arch structures between the 4th and 10th week of development. Histologically, the lesion was benign, but it showed progression clinically. This was the first known case of a fibroma occurring in the larynx.

2242 THE GARDNER SYNDROME: INCREASED TETRAPLOIDY IN CULTURED SKIN FIBROBLAST. (Eng.) Danes, B. S. (Cornell Univ. Medical Coll., New York, NY 10021). *J Med Genet* 13(1): 52-56; 1976.

Skin fibroblast cultures from 2 probands with the Gardner syndrome, 9 affected members of the family of one proband, 2 unaffected members of the same family, 5 relatives by marriage, and 10 normal unrelated individuals were studied to determine whether a cell carrying the Gardner gene will express an abnormality that reliably and reproducibly reflects the presence of this gene. Chromosome preparations from cell lines derived by trypsinization were also studied. At the first subculture, the cell cultures established from the 10 normal subjects and 5 relatives by marriage contained 0-4% cells with more than 46 chromosomes (tetraploid or hypotetraploid); the incidence of tetraploidy remained relatively constant through 18 subcultures. Endoreduplication was observed once in 2,000 divisions, whereas it was observed in all lines from the two probands. As compared with the normal cultures, the cultures from the two probands also showed increased tetraploidy (11-18%) at the first subculture; again, the incidence of tetraploidy remained relatively constant through 18 subcultures. Tetraploidy was observed in 11-31% of the cells from the affected family members of one proband; the degree of tetraploidy was not correlated with subject age or the clinical expression of the Gardner syndrome. The incidence of tetraploidy was 1% in the cultures from the unaffected family members. The increased incidence of tetraploidy in the cultured skin fibroblasts should be of value as a cell marker for the identification of the Gardner gene in families at risk.

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Cancer Res. and Dept. Pathology, Columbia Univ., New York, NY 10032). *Proc Am Assoc Cancer Res* 17: 120; 1976.

2307 PHENOTYPIC INSTABILITY AND DIFFERENTIATION OF NORMAL HUMAN MAMMARY LOBULES AND ATYPICAL LOBULES TRANSPLANTED INTO NUDE ATHYMIC MICE (Proceedings Abstract). (Eng.) Wellings, S. R. (Dept. Medical Pathology, Univ. California, Davis, CA 95616); Jensen, H. M.; DeVault, M. *Proc Am Assoc Cancer Res* 17: 129; 1976.

2308 OCCURRENCE AND PRENEOPLASTIC SIGNIFICANCE OF HYPERPLASTIC ALVEOLAR NODULES (HAN) IN THE STRAIN GR MOUSE (Proceedings Abstract). (Eng.) Miyamoto, M. J. (Cancer Res. Lab. and Dept. Zoology, Univ. California, Berkeley, CA 94720). *Proc Am Assoc Cancer Res* 17: 33; 1976.

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See also:

* (Rev): 1802, 1808, 1811, 1816, 1828, 1829, 1830, 1831, 1832, 1833, 1834, 1836, 1846, 1850, 1863, 1864, 1865, 1866, 1867, 1868, 1869
* (Chem): 1877, 1878, 1887, 1898, 1952, 1966, 2008
* (Phys): 2016, 2021, 2031
* (Viral): 2069, 2120
* (Immun): 2153, 2190, 2192
* (Epid-Biom): 2310, 2311, 2313, 2314, 2316, 2317, 2327, 2328, 2329

2310 METAL AND LUNG CANCER. CHROMIUM-INDUCED LUNG CANCER IN PARTICULAR. (Jpn.) Takemoto, K. (Saitama Med. School, Saitama, Japan). *Jpn J Chest Dis* 35(2): 85-93; 1976.

Chromium-related lung damage occurs in the upper and lower respiratory tracts. Chromate production in Japan, which began about 1933, had already been associated with skin damage and perforation of the nasal septum before World War II. Since 1960, there have been nine deaths from lung cancer in men exposed over 9 yr, 26.5 times the normal male death rate from lung cancer. Chromium-induced lung cancer seems to originate in the pulmonary hilum of the main bronchus. In factories where chromium powders (1-5 microns) abound, dust inhalation leads to emphysematous changes in the lungs. The cytotoxic effect of hexavalent chromium powder probably induces fibrosis, which leads to pulmonary emphysema and other disorders of the lower respiratory tract, including lung cancer. However, for the upper respiratory tract, damage to the sense of smell and perforation of the nasal septum are the primary disorders. There are relatively few laryngeal disorders; light laryngeal inflammation and papilloma formation occur in rare cases. The action of strongly hygroscopic chromium trioxide (CrO_3) vapor on the moist mucous membrane of the nasal passages probably causes the damage. Recent (1975) Japanese newspaper reports of lung cancer due to chromium seepage from industrial dumps need further study, although chromium as an atmospheric pollutant might act synergistically with other pollutants to induce the disease.

2311 CASE STUDY OF VINYL CHLORIDE AS A CARCINOGEN. (Jpn.) Kobayashi, Y. (Engineering Faculty, Yokohama Natl. Univ., Yokohama, Japan). *J Jpn Soc Saf Eng* 15(2): 101-104; 1976.

Cases of hepatic angiosarcoma associated with vinyl chloride monomer (VCM) and various facets of the VCM problem are summarized. VCM production in Japan began in the 1950's, and, in the United States, in the 1930's. In Japan, since 1975, recommended VCM concentrations in the factory atmosphere range from 2 to 5 ppm, and provisions have been made for adequate ventilation. Governmental surveys of 10 representative Japanese factories from 1974 to 1975 showed that 97.3% of the work areas had atmospheric VCM concentrations of less than 3 ppm. Other factories had atmospheric VCM concentrations greater than 5-10 ppm. One case of hepatic angiosarcoma was recently reported among retired Japanese factory workers. According to the National Institute of Occupational Safety and Health (NIOSH, United States), 38 cases of hepatic angiosarcoma worldwide (United States, Canada, Europe) occurred since 1975 among workers exposed to VCM from 4 to 30 yr.

2312 EPIDEMIOLOGICAL STUDIES OF VINYL CHLORIDE HEALTH EFFECTS IN THE UNITED STATES. (Eng.) Falk, H. (Center for Disease Control, United States Public Health Service, Dept. Health, Education, and Welfare, Atlanta, GA 30333); Waxmeiler, R. J. *Proc R Soc Med* 69(4): 303-305; 1976.

The high incidence of hepatic angiosarcoma in the vinyl chloride industry in the United States has prompted a large number of surveys; the results of three of these are examined. A review of death certificates indicated that angiosarcoma comprised 35% of all hepatic sarcomas between 1966-1973; there was also a 2:1 male:female ratio, suggesting that occupational exposure was important in the etiology. A study of polyvinyl chloride workers and controls showed no significant differences between the groups in six liver function tests but these tests are not totally reliable for vinyl chloride-induced disease. In the third study, 12 lung cancer cases were identified in vinyl chloride-exposed workers, but the correlation was not as close here as it was with hepatic angiosarcoma.

2313 TRITIATED THYMIDINE LABELING INDEX OF BENIGN AND MALIGNANT HUMAN BREAST EPITHELIUM. (Eng.) Meyer, J. S. (Jewish Hosp. St. Louis, 216 S. Kings-highway, St. Louis, MO 63110); Bauer, W. C. *J Surg Oncol* 8(2): 165-181; 1976.

Thirty-eight specimens of benign breast tissue from 34 young (19 to 46 yr old) women and 92 primary breast carcinomas were evaluated for tritiated thymidine ($[^3H]$TdR) labeling index (TLI) by in vitro pulse labeling. Of the benign specimens, 23 showed cystic disease, 11 were fibroadenomas, and 4 were histologically normal tissue taken from the patients with fibroadenomas. These women were having regular menstrual cycles. The TLI on nonneoplastic, terminal breast ducts was significantly higher during the latter half than during the first half of the menstrual cycle ($p < 0.001$), and a geometric mean TLI of 1.5 during the latter half of the cycle was consistent with approximately 47% turnover of these cells during the menstrual cycle. Ducts of fibroadenomas showed similar menstrual variation TLI. The range of TLI observed in the carcinomas was 0.04-18.6, arithmetic mean 3.7, geometric mean 2.1. The TLI of carcinomas was not significantly correlated with tumor size, but tended to be higher in women less than 50 yr old than in women older than 50 yr ($p < 0.05$), and in the presence of two or more metastatic axillary lymph nodes than when fewer than two nodes were involved ($p < 0.02$).

2314 THE EXCRETION OF 17-KETOSTEROIDS IN PATIENTS SUFFERING FROM MASTOPATHIA FIBROCYSTICA AND MAMMARY CARCINOMAS. (Eng.) Goerlich, M. (Central Inst. Cancer Res., Acad. Sciences GDR, GDR-1115 Berlin-Buch, Lindenberger Weg 80, E. Germany); Heise, E.; Pradja, N.; Hindy, I. *Arch Geschwulstforsch* 45(7): 648-657; 1975.

Investigations of the urinary excretion of different 17-ketosteroids in healthy women and in patients suffering from mastopathia fibrocytica and/or mammary carcinomas indicated that an age dependency existed during the regenerative period, but this could not be observed in postmenopausal women. Following mastectomy, the excretion values returned to the preoperative level within 12 mo, suggesting a genetically fixed pattern of metabolism and excretion. Epidemiological studies indicated that mastopathia patients had a higher risk of mammary tumors than healthy women, and thus mastopathia may be considered a precancerous disease.

2315 ASSOCIATION BETWEEN TEEN-AGE OBESITY AND CANCER IN 56,111 WOMEN: ALL CANCERS AND ENDOMETRIAL CARCINOMA.

(Eng.) Blitzer, P. H. (Medical Coll. Wisconsin, 1725 West Wisconsin Ave., Milwaukee, WI 53233); Blitzer, E. C.; Rimm, A. A. *Prev Med* 5(1): 20-31; 1976.

Historical data from 56,111 women of varying obesities (members of TOPS Club, Inc.) were analyzed for association of teenage obesity with prevalence of all cancers and with endometrial carcinoma. This study shows no relationship between obesity level and cancer in general. Women who were of high obesity as teenagers had a relative risk of 1.62 of developing endometrial carcinoma compared to women who were of low obesity as teenagers. The relative risk was 1.75 for those highly obese both currently and as teenagers. Results indicate that teenage obesity may predispose to endometrial carcinoma, confirming reports based on observation of hospital-drawn endometrial carcinoma populations, and supporting the theory that obesity induces estrogens predisposing to endometrial carcinoma. Limitations of TOPS women as a study population include: absence of underweight women to indicate the effect of thinness; selection of women concerned about their obesity; and exclusion of women with a history of cancer who, reacting nihilistically to the diagnosis, would not join TOPS.

2316 ATYPICAL SMALL-CELL DYSPLASIA AND IN SITU CARCINOMA OF THE BREAST: INCIDENCE OF SUBSEQUENT INVASIVE CARCINOMA.

(Eng.) Toker, C. (Mount Sinai Sch. Medicine, City Univ. New York, NY 10029). *Mt Sinai J Med NY* 43(3): 232-237; 1976.

A review of 4,025 breast biopsies taken during the 29-year period 1946-1974 inclusive revealed 189 cases of atypical small-cell dysplasia and in situ carcinoma, an average incidence of 4.7%. Lesions were classified, according to the degree of severity, into three grades: atypical dysplasia, indeterminate, and frank in situ carcinoma. Long-term observation indicated that these patients had a higher incidence of subsequent invasive carcinoma in the ipsilateral breast than normally expected in the general population, but numbers were not sufficient for a comparison between the grades. Mastectomy should be performed for the florid and frank in situ carcinomas, while a more conservative attitude toward alterations of lesser magnitude should be adopted.

2317 HASHIMOTO'S THYROIDITIS AND BREAST CANCER.

(Eng.) Maruchi, N. (Mayo Graduate Sch. Medicine, Univ. Minnesota, Rochester, MN); Annegers, J. F.; Kurland, L. T. *Mayo Clin Proc* 51(5): 263-265; 1976.

The possible association between Hashimoto's thyroiditis and breast cancer was evaluated in an autopsy series and a followup of a cohort of patients with Hashimoto's thyroiditis. In the autopsy study, 174 subjects with histologic diagnosis of Hashimoto's thyroiditis were matched with a control group. There was no significant difference in the frequency of a history of breast cancer in the two groups (9% and 7%, respectively). In the cohort of 484 cases (Olmsted County, MN) with a clinical or histologic diagnosis of Hashimoto's thyroiditis for whom there was a substantial followup period, no excess frequency of breast cancer was noted (the predicted frequency was 4.8, the number of cases was 5). These results contrast with a report that Japanese women with Hashimoto's thyroiditis were a high risk group for cancer. The results of the present study do not indicate an association between the two diseases.

2318 AGE AT FIRST COITUS AND CHOICE OF CONTRACEPTIVE METHOD: PRELIMINARY REPORT ON A STUDY OF FACTORS RELATED TO CERVICAL NEOPLASIA.

(Eng.) Merritt, C. G. (Res. Div., Office Population, Agency International Development, Washington, DC); Rosenberg, S. H.; Edington, B.; LoSciuto, L. A. *Soc Biol* 22(3): 255-260; 1975.

The relationship between reported age at first coitus and years of education, current age, number of previous pregnancies, choice of contraceptive method, and ethnicity was investigated using the analysis of covariance. Initial interviews and recording of gynecologic examination results for 12,000/25,000 women in the study group have been completed and are the basis for this study. The women attend large clinic and group health centers in nine continental cities and in three cities in Puerto Rico. Years of education and current age each had a significant effect on age at first coitus. The mean age at first coitus varied from 20.2 yr for Mexican Americans to 17.5 yr for North American Blacks and from 18.8 yr for oral contraceptive users to 18.7 yr for intrauterine device users. It is suggested that these differences in reported age at first coitus are not likely to be important on biological grounds; the cervix, and especially the squamo-columnar junction, where nearly all the lesions arise, has ordinarily completed its change in position well before the age of 19. Population surveillance data provide no evidence to suggest that widespread use of the oral contraceptives in the mid-to-late 1960's has been followed by increasing rates of carcinoma in situ in later years. The present results are consistent with those of previous epidemiological research, which has failed to reveal significant retrospective associations between oral contraceptive use and abnormal cervical cytology.

2319 EARLY ONSET OF ORAL CANCER AMONG WOMEN WHO SMOKE AND DRINK (Proceedings Abstract).

(Eng.) Bross, I. D. J. (Roswell Park Memorial Inst., Buffalo, NY 14263); Coombs, J. *Proc Am Assoc Cancer Res* 17: 1; 1976.

2320 TIME TRENDS IN CERVICAL CANCER: BALTIMORE, 1950-1969 (Proceedings Abstract).

(Eng.) Kessler, I. I. (Johns Hopkins Univ., Baltimore, MD

21205); Costin, C. *Proc Am Assoc Cancer Res* 17: 130; 1976.

2321 THE RELATION OF HEPATITIS B INFECTION TO PRIMARY HEPATIC CARCINOMA AND CHRONIC LIVER DISEASE IN WEST AFRICA (Proceedings Abstract). (Eng.) Larouze, B. (Inst. Cancer Res., Fox Chase Cancer Center, Philadelphia, PA 19111); London, W. T.; Saimot, G.; Payet, M.; Blumberg, B. S. *Proc Am Assoc Cancer Res* 17: 164; 1976.

2322 ADENOCARCINOMA OF THE LUNG IN A DEFINED AREA (Proceedings Abstract). (Eng.) Donovan, J. F. (Kern Community Cancer Center, Bakersfield, CA 93301); Lahiri, S. R. *Proc Am Assoc Cancer Res* 17: 145; 1976.

2323 IMMUNOLOGIC ASPECTS OF FULMINATING BREAST CANCER IN TUNISIA (Proceedings Abstract). (Eng.) Mourali, N. (Inst. Salah Azaiz, Bab Saadoun, Tunis, Tunisia); Tabbane, F.; Djaziri, M.; Cammoun, M.; Souissi, T.; Ben Attia, A.; Levine, P. H. *Proc Am Assoc Cancer Res* 17: 166; 1976.

2324 TEA DRINKING HABITS AND ESOPHAGEAL CANCER IN ADJACENT LOW AND HIGH INCIDENCE AREAS OF IRAN (Proceedings Abstract). (Eng.) Mahboubi, E. (Eppley Inst. Res. Cancer, Univ. Nebraska Medical Center, Omaha, NE 68105); Ghadirian, P. *Proc Am Assoc Cancer Res* 17: 87; 1976.

2325 ON THE OCCUPATIONAL EPIDEMIOLOGY OF CANCER OF THE ESOPHAGUS (Proceedings Abstract). (Eng.) Houten, L. (Dept. Biostatistics, Roswell Park Memorial Inst., 666 Elm St., Buffalo, NY 14263). *Proc Am Assoc Cancer Res* 17: 185; 1976.

2326 REDUCED LYMPHOID NEOPLASIA INCIDENCE AND MORTALITY RATES WITH INCREASING ALTITUDE (Proceedings Abstract). (Eng.) Rosenlof, R. (Univ. Nebraska Medical Center, Omaha, NB 68105); Lemon, H.; Aldrich, H.; Caldwell, G.; Dubes, G. *Proc Am Assoc Cancer Res* 17: 154; 1976.

2327 GENETICS AND CANCER CONTROL (Proceedings Abstract). (Eng.) Guirgis, H. (Creighton Univ. Sch. Medicine, Omaha, NB 67178); Lynch, H.; Foley, J.; Lynch, P.; Lynch, J.; Lemon, H. *Proc Am Assoc Cancer Res* 17: 295; 1976.

2328 NEW DEVELOPMENTS IN BREAST CANCER GENETICS (Proceedings Abstract). (Eng.) Lynch, H. (Creighton Univ. Sch. Medicine, Omaha, NB 68178); Mulcahy, G.; King, M. C.; Elston, R.; Maloney, K.; Rankin, L.; Foley, J.; Lemon, H. *Proc Am Assoc Cancer Res* 17: 295; 1976.

2329 FATE OF CHRONIC ADULT LYMPHOCYTOSIS (Proceedings Abstract). (Eng.) Feleppa, V. (Univ. Nebraska Medical Center, Omaha, NB 68105); Rosenlof, R. C.; Lemon, H. M. *Proc Am Assoc Cancer Res* 17: 298; 1976.

2330 INCIDENCE OF SECOND MALIGNANT NEOPLASMS (SMN) IN CHILDREN (Proceedings Abstract). (Eng.) Meadows, A. (Children's Hosp., Philadelphia, PA 19104); D'Angio, G.; Mike, V.; Sinks, L.; Jaffe, N. *Proc Am Assoc Cancer Res* 17: 259; 1976.

See also:

* (Rev): 1804, 1807, 1808, 1809, 1817, 1818, 1828, 1829, 1835, 1836, 1837, 1838, 1839, 1844, 1845, 1848, 1849, 1850, 1864, 1865, 1866, 1867
* (Chem): 1907, 1911
* (Phys): 2023
* (Viral): 2081
* (Path): 2247, 2251, 2271, 2286, 2304

2331 DISULFIDE BONDING IN CHROMATIN PROTEINS WITH AGE AND A SUGGESTED MECHANISM FOR AGING AND NEOPLASIA. (Eng.) Tas, S. (Univ. Hosp. South Manchester, England). *Exp Gerontol* 11(1/2): 17-24; 1976.

In order to investigate the mechanisms of aging, chromatin from male Sprague-Dawley rat livers and blowflies was isolated and the state of the sulfhydryl groups of chromatin proteins was investigated through their reactivity with iodo(2-^{3}H)acetic acid and 5-5'-dithiobis-2-nitrobenzoic acid. With aging the chromatin proteins entered a more compact state and this compactness was at least partially due to the increased number of disulfide bonds. The disulfide bonds appeared to have an effect on the genetic activity of the DNA. A DNA sequence thus bound would go through replication and transcription with more difficulty and more errors than younger cells not bound. Increased numbers of proteins and a decrease in the number of important proteins would eventually lead to the death of the cell. Since neoplastic cells do not show senescent changes but do show these changes in the metaphase, this mechanism could also be involved in neoplasia.

2332 CIRCADIAN RHYTHM OF THE MITOTIC ACTIVITY AND OF THE NUMBER OF DNA SYNTHESIZING NUCLEI IN SARCOMA-37 OF ALBINO MICE. (Rus.) Demskii, V. I. (Second Moscow N. I. Pirogov Medical Inst., Moscow, USSR). *Biull Eksp Biol Med* 80(10): 102-104; 1975.

Circadian variations in the frequency of mitoses and in the number of nuclei labeled with thymidine-^{3}H in murine sarcoma-37 were investigated. The maximum value of the mitotic index (MI) in the tumor was observed at 10 hr, and the minimal value, at 1 hr, with circadian fluctuations in the indexes of both unlabeled and labeled mitoses. In cells with labeled mitosis the G_2 phase lasted approximately 1 hr, and in cells with unlabeled mitosis, it lasted 4 hr and longer. On the basis of differences in circadian rhythms of the MI of labeled and unlabeled mitoses and in the duration of the G_2 phase, the presence of two diverse cell populations in sarcoma-37 is suggested.

2333 DNA SYNTHESIS AND SOME MORPHOMETRIC CHANGES IN THE LIVER DURING DIFFERING REGIMENS OF NUTRITION. (Eng.) Burkova, T. T. (Centre Hygiene Sofia, Bulgaria); Krustev, L. P. *Gegenbaurs Morphol Jahrb* 121(5): 617-621; 1975.

The effect of undernutrition and physical strain on the regenerative processes in the liver was studied in albino rats by historadiography and morphometry. The rats were put on a full value diet with or without physical loading (swimming up to 70 min) for 20 or 140 days, or a deficient diet (60% of normal diet) under the same parameters. The rats were injected, 50 min prior to sacrifice, with 1 Ci/g ^{3}H-thymidine. Material was taken from the right hepatic lobe, historadiograms were made, and the marked mitoses were counted. The groups under physical loading, even with a normal diet, showed a higher synthesis of DNA. The combination of defective diet and physical loading resulted in the highest percentage of marked cells both for 20 and 140 days. In the defective diet groups, the hepatocyte nuclei were seven to eight times smaller than in normally fed groups. The results generally indicate that the physical loading served as a starting mechanism and stimulator to proliferation, that the defective diet caused a decrease in nuclei, and that the quantity of the enlarged nuclei varied according to the stage of DNA synthesis.

2334 CHANGES IN CYTOPLASMIC POLY(A)-RICH RNA IN WI-38 CELLS STIMULATED TO PROLIFERATE. (Eng.) Novi, A. M.; Baserga, R. In: *Fundamental Aspects of Neoplasia*. Edited by A. A. Gottlieb; O. J. Plescia; D. H. L. Bishop. (New York: Springer-Verlag): pp. 375-387; 1975.

The authors investigated changes in poly(A)-rich cytoplasmic RNA occurring in WI-38 cells stimulated to proliferate by replacing the old medium with fresh medium containing 10% fetal calf serum. The poly(A) content of stimulated and quiescent cells was assessed by hybridization with ^{3}H-poly(U). Stimulation of WI-38 cells by a change in medium induced a biphasic increase in the incorporation of ^{3}H-adenosine into poly(A)-rich polysomal RNA that constantly exceeded the amount of radioactivity incorporated into total cellular RNA (as measured by incorporation of ^{3}H-adenosine into the acid-insoluble alkali-labile total cellular fraction). Poly(A)-rich RNA was also present in the post-polysomal supernatant of both quiescent and stimulated WI-38 cells. Stimulation of cell proliferation induced an increase in the incorporation of ^{3}H-adenosine into postpolysomal RNA that paralleled the incorporation into polysomal RNA. Actinomycin D at a concentration of 0.09 g/ml decreased the incorporation of ^{3}H-adenosine into poly(A)-rich polysomal RNA by 50% in both stimulated and control cells. The results indicate that the early increase in ^{3}H-adenosine incorporation into poly(A)-rich cytoplasmic RNA is related to the subsequent stimulation of DNA synthesis.

2335 LOCALIZATION AND CHARACTERIZATION OF NEWLY SYNTHESIZED NUCLEAR RNA IN ISOLATED RAT HEPATOCYTES. (Eng.) Fakan, S. (Institut Suisse de Recherches Experimentales sur le Cancer, 1011 Lausanne, Switzerland); Puvion, E.; Spohr, G. *Exp Cell Res* 99(1): 155-164; 1976.

The ultrastructural localization of extranucleolar RNA transcribed during short periods of labeling with [^{3}H]UdR in isolated rat hepatocytes was studied. The labeled RNA was characterized in parallel experiments by electrophoresis under denaturing conditions. In ultrathin sections of Epon embedded cells, labeled for 2-5 min, the radioactivity was mainly associated with perichromatin fibrils frequently found in proximity to condensed chromatin regions. Autoradiographs of ultrathin frozen sections confirmed the perichromatin localization of the rapidly labeled RNA. The great majority of this label was in growing chains of pre-mRNA. After 2 or 4 hr of non-radioactive chase following the radioactive incubation, the major part of silver grains was still associated with perichromatin fibrils, but it was distributed homogenously throughout the neoplasm. This suggests a migration of a part of the labeled perichromatin fibrils toward the interchromatin regions. At this time the label is characterized as pre-mRNA of intermediate size. The first phases of pre-mRNA processing may be associated with the perichromatin fibrils.

2336 EFFECTS OF PROLONGED QUIESCENCE ON NUCLEI AND CHROMATIN OF WI-38 FIBROBLASTS. (Eng.) Rossini, M. (Temple Univ. Health Sciences Center, Philadelphia, PA 19140); Lin, J.-C.; Baserga, R. *J Cell Physiol* 88(1): 1-11; 1976.

DNA synthesis and cell division are markedly reduced in confluent monolayers of WI-38 diploid fibroblasts, but resume again if the depleted medium is replaced by fresh medium containing 10% fetal calf serum. If the cells are kept quiescent for prolonged periods of time after confluence (1 or 2 wk), the fraction of cells that can be stimulated to proliferate by fresh serum decreases and the length of the prereplicative phase increases. The template activity of isolated nuclei decreases with increasing time of quiescence. Parallel changes also occur in chromatin, as evidenced by circular dichroism spectra and the capacity to bind the intercalating dye, ethidium bromide. When cells are restimulated, two distinct steps, both requiring serum, can be identified in this prereplicative phase. Nothing is known of the changes that occur in the first step but it allows the cells to proceed to the second step, when quiescent cells are stimulated to proliferate and then enter the second step, which is characterized by an increase in template activity of the nuclei and changes in the structure of chromatin. These results seem to indicate that during prolonged quiescence, WI-38 fibroblasts go into a deeper G_0 state from which they can be rescued only after prolonged stimulation. In this respect, prolonged quiescence may bear some resemblance to the aging process.

2337 LOSS OF CONTROLLED NUCLEAR DIVISION IN BHK21 CELLS PASSED *IN VIVO*. (Eng.) O'Neill, F. J. (Univ. Utah Medical Center, Salt Lake City, UT 84113). *Cancer Res* 36(6): 2019-2024; 1976.

When low-passage BHK21/C13 cells, which respond to cytochalasin B (CB) by undergoing limited or controlled nuclear division, were inoculated into weanling hamsters, sc, tumors appeared within 3 to 4 wk with as few as 10^3 cells. When these cells were returned to cell culture, they responded to CB with uncontrolled nuclear division and premature chromosome condensation regardless of the number of cells originally inoculated into animals. Extensive examination of CB-treated C13 cells revealed that 1 of 1,250 cells was highly multinucleated, although not as highly multinucleated as tumor cells. This supports the possibility that a loss of controlled nuclear division in BHK cells is closely associated with or required for tumorigenicity, with in vivo passage selecting for a rare tumorigenic variant. However, three separate clones of C13 cells were found to be tumorigenic, which supports the possibility that loss of controlled nuclear division is secondary to tumorigenicity and results when cells are passed in vivo. BHK21/C13 and various BHK21 tumors all appeared to grow to concentration densities markedly higher than hamster embryo fibroblasts. That tumor cells usually grew to the same density as did BHK21/C13, or only slightly higher, suggests that loss of contact inhibition is not sufficient for loss of controlled nuclear division. It also suggests that the hypothetical 1 of 1,000 tumorigenic cells and 1 of 1,250 cells with uncontrolled nuclear division do not overgrow the ''normal'' cells, because all cells grow to similar densities. The relationship between the ability to grow in agar and uncontrolled nuclear division was also examined. Approximately 1 of 2,500 C13 cells were able to form colonies in agar. All three colonies isolated showed normal control of nuclear division. These results show that the ability to grow in agar may be separate from the expression of uncontrolled nuclear division. They also suggest a fundamental difference between tumor cells and cells that have been grown in agar.

2338 EFFECT OF THE GROWTH STATE ON PROTEIN TURNOVER IN L CELLS. (Eng.) Tanaka, K. (Sch. Medicine, Tokushima Univ., Tokushima, 770, Japan); Ichihara, A. *Exp Cell Res* 99(1): 1-6; 1976.

The half-lives of proteins with rapid and slow turnovers were compared in suspension cultures of L cells in growing and nongrowing states, by measuring $[^3H]$leucine-labeled proteins. When proteins were labeled for a few hours, the half-lives of proteins in the nongrowing cells were one-third of those in the growing cells. However, when proteins were labeled for a longer period their half-lives appeared similar in the growing and nongrowing states. The protein synthesis decreased and the protein degradation increased as the cell density augmented during cell growth. From the decay curves of proteins labeled for 2 and 20 hr in the two growth states it was calculated that the half-lives of proteins with a rapid turnover is 11 hr in the nongrowing and 29 hr in the growing state. For proteins with a slow turnover the half-life is 40-50 hr in both states. The activity of cathepsin D was twice as high in the nongrowing as in the growing state, which may explain the difference in protein turnover in the two growth states.

2339 CELL DIVISION AND METABOLIC ACTIVITY OF NAEVUS CELLS. THE RELATIONSHIPS BETWEEN ANATOMY AND BEHAVIOUR IN MOLES. (Eng.) Bentley-Phillips, C. (Welsh Natl. Sch. Medicine, Heath Park, Cardiff CF4 4XW, Wales); Marks, R. *Br J Dermatol* 94(5): 557-563; 1976.

Thirty moles (19 intradermal, 11 compound) were studied by in vitro techniques employing tritiated precursor compounds in order to demonstrate replicative and metabolic activity in nevus cells. Autoradiographs prepared from the incubated tissue showed that thymidine incorporation occurred at all anatomical levels (e.g., subepidermal and upper dermal) within the nevi. Synthesis of macromolecules also occurred throughout the mole, but more actively in the junctional and superficial zones. The term ''junctional activity'' does not appear to have any meaning in cell kinetic terms and is not associated by any proliferative capacity.

2340 MEMBRANE TRANSPORT IN SYNCHRONIZED EHRLICH ASCITES TUMOR CELLS: UPTAKE OF AMINO ACIDS BY THE A AND L SYSTEM DURING THE CELL CYCLE.

(Eng.) Tupper, J. T. (Dept. Biology, Syracuse Univ., Syracuse, NY 13210); Mills, B.; Zorgniotti, F. *J Cell Physiol* 88(1): 77-88; 1976.

By using the double thymidine block technique, Ehrlich ascites tumor cells (ELD) carried in continuous spinner culture were synchronized. Simultaneous monitoring of ^{3}H-thymidine incorporation, cell number, and mitotic index yielded a cell cycle time of approximately 13.5 hr. This was composed of an S period of 3-4 hr, G_2 of 6-8 hr, and M of 1-2 hr. No appreciable G_1 was present. Ehrlich cells synchronized in this manner were used to investigate the characteristics of two neutral amino acid transport systems during progression through the cell cycle. Unidirectional influx via the Na-dependent system A was studied, with C^{14}-α-aminoisobutyrate (AIB) as substrate. The Na-independent system L was monitored with ^{3}H-leucine and ^{14}C-cycloleucine as substrates. Transport by the A system was minimal in M and early S. It underwent a threefold increase during late S and early G_2. In mid G_2 the transport via this system rapidly dropped and remained low again through M and early S. The intracellular/extracellular ratios of AIB indicate that the system is actively transporting AIB throughout the cell cycle. The minimum ratios (approximately 3) were achieved during early M and the maximum ratios (approximately 9) were achieved in late S, early G_2. The uptake of leucine and cycloleucine by the L system was quite different during the cell cycle. Maximal unidirectional influx by this system occurred during early and mid S period. Upon progression into G_2 the transport rate dropped and remained reduced throughout M. Intracellular/extracellular ratios of leucine or cycloleucine were near unity at the peak of the transport activity (early S) and dropped to values of 0.5 to 0.6 throughout the remainder of the cycle. This result indicates that inward transport by the L system is, for the most part, nonactive in growing cells. Growth is probably inhibited, then, by the failure of one or more transport systems to achieve an elevation of net amino acid influx in early or mid S phase, thus inhibiting further progression of the cell cycle.

2341 SUBDIVISION OF THE G1 PHASE OF HUMAN GLIA CELLS IN CULTURE.

(Eng.) Lindgren, A. (Wallenberg Lab., Univ. Uppsala, S-75122 Uppsala, Sweden); Westermark, B. *Exp Cell Res* 99(2): 357-362; 1976.

The stimulation of serum-deprived sparse cultures with different agents was investigated. Human glia cells blocked postmitotically by serum deprivation required about 8-12 hr of continuous stimulation by growth factors to become committed to DNA synthesis. Factors that counteracted stimulation apparently acted by reducing the number of cells entering the S phase rather than by slowing them down or changing the course of the prereplicative phase of the responding cells. DNA synthesis began about 5 hr after growth factor withdrawal. The length of time until the S phase began and the length of the apparent commitment period, i.e., the time when cells progressed toward the G1/S transition point even in the absence of growth factors, were independent of the nature of the growth factors studied (calf serum, platelet-rich human serum, epidermal growth factor). Epidermal growth factor and calf serum were mutually interchangeable during the precommitment period. Increasing cell density reduced the number of cells that entered DNA synthesis, but had no effect on the growth of the apparent commitment period or the latent time until DNA synthesis commenced. The requirement for a long exposure to a growth factor may be an important safeguard in normal cells against ''accidental'' entry into the cell cycle, since malignant glia cells do not show the same requirement.

2342 URINARY EXCRETION OF CYCLIC GUANOSINE 3':5'-MONOPHOSPHATE AND CYCLIC ADENOSINE 3':5'-MONOPHOSPHATE IN RATS BEARING TRANSPLANTABLE LIVER AND KIDNEY TUMORS.

(Eng.) Criss, W. E. (Univ. Florida Medical Sch., Gainesville, FL 32610); Murad, F. *Cancer Res* 36(5): 1714-1716; 1976.

Cyclic guanosine 3':5'-monophosphate (cyclic GMP) and cyclic AMP were measured in the urine of normal Buffalo and ACl rats and those bearing transplantable liver and kidney tumors. The level of cyclic GMP ranged from 1.4 to 1.6 μmoles/g urinary creatinine in several strains of rats without tumors. Rats bearing Morris hepatomas 20, 21, 9618A and 9633F and kidney tumor MK2 had urine levels of cyclic GMP from 1.3 to 3.6 μmoles/g creatinine. Rats bearing the fast growing hepatomas 9618A2 and 3924A and Morris kidney tumor MK3 had urinary values of 5.6, 41.9, and 32.7 μmoles cyclic GMP/g creatinine, respectively. Urine levels of cyclic AMP ranged from 10.1 to 19.7 μmoles/g creatinine in all normal and tumor-bearing rats and were not significantly different in any of the groups examined.

2343 EXTERNAL CYCLIC AMP-DEPENDENT PROTEIN KINASE ACTIVITY IN RAT C-6 GLIOMA CELLS.

(Eng.) Schlaeger, E.-J. (Fachbereich Biologie, Universitaet Konstanz, D-7750 Konstanz, W. Germany); Koehler, G. *Nature* 260(5553): 705-707; 1976.

The authors determined the effect of extracellular cyclic AMP on the ability of a protein kinase of intact rat C-6 glioma cells to phosphorylate an exogenous substrate. The results with the use of added histones as a substrate suggested that the actively growing cells have a cyclic AMP-dependent protein kinase, possibly on the external surface of the membrane, that can be stimulated from without. A small amount of ^{32}P remained with the cells regardless of whether the cells were stimulated or unstimulated. Noradrenaline was capable of inducing secretion of cyclic AMP from the glioma cells.

2344 REGULATION OF THE ADENYLATE CYCLASE SYSTEM IN TRANSPLANTABLE HEPATOMAS. (Eng.) Criss, W. E. (Univ. Florida Medical Sch., Gainesville, FL 32610); Morris, H. P. *Cancer Res* 36(5): 1740-1743; 1976.

Adenylate cyclase systems were examined in purified membrane preparations from normal rat liver and from several Morris hepatomas with differing growth rates. All tumor membrane preparations had lower relative specific activities than did liver preparations. Liver adenylate cyclase was stimulated by fluoride, glucagon and guanyl-5'-yl imidodiphosphate [Gpp(NH)p]. Membranes from two slow-growing hepatomas contained adenylate cyclase activities that were also stimulated by each of these three modulators. Membrane adenylate cyclases from several fast-growing hepatomas were marginally stimulated by glucagon but were readily stimulated by fluoride and Gpp(NH)p. Examination of the highly specific binding of ^{125}I-glucagon to the various membrane preparations revealed much less binding in all the tumor membranes than in liver membranes. More detailed kinetic examination of membranes prepared from liver, slow-growing hepatoma 21 (which had reasonable binding to and stimulation by glucagon), and fast-growing hepatoma 3924A (which had marginal binding to and stimulation by glucagon) revealed major differences in rates of cyclic AMP production in the absence and presence of glucagon, Gpp(NH)p, and glucagon plus Gpp(NH)p, and in the combined alteration of Mg:ATP ratio and temperature. The different kinetic characteristics in the hepatoma adenylate cyclase systems may be due to different structural characteristics of the tumor membranes or to altered hormonal receptors, catalytic units, or receptor-catalytic unit interrelationships within the tumor membrane.

2345 NEUROBLASTOMA CELL ADENYLATE CYCLASE: DIRECT ACTIVATION BY ADENOSINE AND PROSTAGLANDINS. (Eng.) Penit, J. (Laboratoire de Physiologie Cellulaire, College de France, 75231 Paris Cedex 05, France); Huot, J.; Jard, S. *J Neurochem* 26(2): 265-273; 1976.

Adenylate cyclase activity of permeabilized neuroblastoma cells (NS20) was measured by the conversion of [α^{32}P]ATP into labeled cyclic AMP (cAMP). Adenosine (10^{-6} to 10^{-4} M) induced a dose-dependent increase in cAMP formation. This effect could not be accounted for either by an adenosine-induced inhibition of the phosphodiesterase activity present in the enzyme preparation, or by a direct conversion of adenosine into cAMP. This indicates that the observed increase in cAMP accumulation reflected an activation of adenylate cyclase. Adenosine is partially metabolized during the course of incubation with the enzyme preparation. However, none of the identified non-phosphorylated adenosine metabolites were able to induce an adenylate cyclase activation. This suggests that adenosine itself is the stimulatory agent. The apparent Km of the adenylate cyclase for adenosine was 5 x 10^{-6} to 10^{-5} M. Maximal activation represented 3-4 times the basal value (10-100 pmol cAMP formed/10 min/mg protein). The adenosine effect was stereospecific, since structural analogues of adenosine were inactive. Adenosine increased the maximal velocity of the adenylate cyclase reaction. The stimulatory effect of adenosine was inhibited by theophylline. Prostaglandin PGE$_1$ had a stimulatory effect much more pronounced than that of adenosine (6- to 10-fold the basal value at 10^{-6} M). Dopamine and norepinephrine induced a slight adenylate cyclase activation which was not potentiated by adenosine. It was concluded that adenosine is able to directly activate neuroblastoma cell adenylate cyclase. It seems likely that such a direct activation is also present in intact nervous tissue and accounts, at least in part, for the observed cAMP accumulation in response to adenosine.

2346 STUDIES ON GLYCOGEN METABOLISM IN HUMAN LEUKEMIC CELLS. I. GLYCOGEN CONTENT, GLYCOGEN SYNTHETASE FORMS AND THEIR METABOLIC INTERCONVERSION. (Eng.) Cusso, R. (Departamento de Bioquimica, Facultad de Farmacia, Barcelona-14, Spain); Domingo, A.; Rosell-Perez, M. *Rev Esp Fisiol* 31(4): 309-316; 1975.

Glycogen levels, glycogen synthetase activity, and the possibility of interconversion between its two forms in different types of leukemic cells were investigated in the leukocytes of chronic myelocytic, acute myeloblastic, chronic lymphocytic, acute lymphoblastic, acute monoblastic, and undifferentiated leukemias. A decrease in glycogen content and glycogen synthetase activity was observed in leukemic leukocytes compared to those of normal humans, but there was a lesser decrease in chronic myeloid leukemic leukocytes than in those of acute leukemic patients. Incubation of crude leukocyte homogenates at 30 C before assay of the enzyme activity revealed that glycogen synthetase was converted from the D to the I form in acute myeloblastic, acute lymphoblastic, chronic lymphocytic, acute monoblastic, and undifferentiated leukocytes. The conversion did not occur in crude homogenates from leukocytes of chronic myeloid leukemic patients. ATP-Mg converted the I form to the D form in acute myeloblastic, chronic lymphocytic, and undifferentiated leukemic leukocytes. This conversion was not observed in chronic myelocytic leukemic leukocytes.

2347 DIFFERENTIATION ASSOCIATED CHANGES IN THYMIDYLATE SYNTHETASE AND THYMIDINE KINASE ACTIVITIES IN INTESTINAL CELLS. (Eng.) Peterson, A. M. (Memorial Sloan-Kettering Cancer Center, New York, NY 10021). *Cell Differ* 5(1): 37-43; 1976.

Proliferative and mature intestinal cells of the jejunum and colon of rat, colon of man, and the surface cells of neoplastic colon lesions of man were assayed for thymidylate synthetase and thymidine kinase activities. Cells from the proliferative region of rat jejunal mucosa had higher enzyme activities than cells from the nonproliferative region. Thymidylate synthetase activity decreased as cells migrated from base to upper crypt, whereas thymidine kinase activity increased during crypt migration and then declined as cells migrated onto villi. Thymidine kinase activity also remained elevated longer than thymidylate synthetase during cell migration in colonic mucosa of rat and man. High thymidine kinase: thymidylate synthetase ratios similar to those observed in flat mucosa before cells become fully mature were found in cells removed from expanding neoplastic lesions of man.

2348 CYCLIC NUCLEOTIDE PHOSPHODIESTERASE ACTIVITY IN NORMAL AND NEOPLASTIC RAT MAMMARY CELLS GROWN IN MONOLAYER CULTURE. (Eng.) Cohen, L. A. (American Health Foundation, Valhalla, NY 10595); Straka, D.; Chan, P.-C. *Cancer Res* 36(6): 2007-2012; 1976.

The activity and subcellular distribution of cyclic adenosine 3':5'-monophosphate cyclic 3':5'-nucleotide phosphodiesterase (cAMP PDE) obtained by subcellular fractionation of cultured normal and neoplastic mammary epithelium were compared. The activity of PDE (EC 3.1.4.17) was measured in cultured normal and neoplastic rat mammary epithelium. Total PDE activity in normal cells was 1.6 to 6 times higher than that in tumor cells with 0.01 to 1 mM cAMP. PDE activity was distributed between the low-speed (4000 x g) particulate and supernatant fractions in both cell lines, with the particulate fraction possessing 60% to 70% of the total. Double reciprocal kinetic plots were nonlinear, suggesting the presence of high- and low-affinity PDE activities. Similar but not identical biphasic curves obtained from both normal and neoplastic cells suggested that at least two different PDE activities were present in a membrane-bound as well as a soluble form. Apparent Michealis constants for the high-affinity enzyme ranged from 2 to 6 μM; the low-affinity enzyme was 1 μM. In the presence of 10 μM caffeine and at a substrate concentration of 1 μM, PDE activity was inhibited 40% and 80% of basal levels in normal and tumor cells, respectively. The membrane-bound enzyme was generally inhibited to a greater extent than the soluble. Although normal cells exhibited higher PDE activities in terms of total specific activity, when soluble activities were compared at low substrate concentrations, the opposite was the case. At a substrate concentration of 0.01 μM, normal cell, low-Km soluble specific activity was 40% less than comparable tumor cell activity. These results support the contention that PDE is induced by its own substrate, cAMP, and that the low cAMP steady-state levels characteristic of malignant cells are maintained by a soluble high-affinity isozyme of PDE.

2349 CARCINOEMBRYONIC ANTIGEN AND PHOSPHOHEXOSE ISOMERASE, GAMMA-GLUTAMYL TRANSPEPTIDASE AND LACTATE DEHYDROGENASE LEVELS IN PATIENTS WITH AND WITHOUT LIVER METASTASES. (Eng.) Munjal, D. (Univ. Kentucky Sch. Medicine, Lexington, KY); Chawla, P. L.; Lokich, J. J.; Zamcheck, N. *Cancer* 37(4): 1800-1807; 1976.

Plasma carcinoembryonic antigen (CEA) and serum enzyme levels of phosphohexose isomerase (PHI), gamma-glutamyl transpeptidase (γGTP), and lactate dehydrogenase (LDH) were measured in 147 patients with malignancy. Levels were higher in patients (particularly those with gastrointestinal, breast, and lung cancers) than in normal individuals or in patients with cancer in clinical remission. Elevations of CEA and of all three enzymes in blood were most frequent in patients with hepatic metastases. CEA elevations correlated directly with PHI levels. Seventy-eight percent of patients with metastatic gastrointestinal cancer could be identified by CEA (>5 ng/ml) alone, as well as 38% with breast cancer and 85% with lung cancer; but only 17% of other cancers could be identified by CEA alone. CEA or one or more enzymes was elevated in 64% of metastatic breast cancer patients, 92% of lung cancer, and 41% of other cancers, but enzyme measurement did not increase identification of gastrointestinal cancer over that achieved by CEA alone. These findings suggest that circulating levels of CEA, PHI, γ-GTP and LDH may reflect a direct contribution from the malignant tissue and/or liver malfunction secondary to liver replacement.

2350 ADVANCE OF MITOSIS BY HISTONE PHOSPHOKINASE. (Eng.) Inglis, R. J. (Portsmouth Polytechnic, Gun House, Hampshire Terrace, Portsmouth, England); Langan, T. A.; Matthews, H. R.; Hardie, D. G.; Bradbury, E. M. *Exp Cell Res* 97(2): 418-425; 1976.

Based on the previous observations that growth associated histone kinase (HKG) from Ehrlich ascites cells stimulates mitosis in *Physarum polycephalum*, experiments were undertaken to establish the specificity of HKG in vitro with chromatin as substrate and to investigate the nature of the stimulated mitosis. Plasmodia were treated with HKG and a more purified (step 2) HKG in the presence of calf thymus chromatin in vitro, but the extract was still heteropurified extracts from Ehrlich ascites chromatin to the plasmodia advanced the time of mitosis in the plasmodia without apparently affecting the mitotic process itself or the initiation of DNA synthesis immediately afterwards. The chromatin extract phosphorylated F1 histone specifically in calf thymus chromatin in vitro, but the extract was still heterogeneous and the effect on plasmodia may have been due to some other protein that growth-associated HKG. However, a partially purified HKG preparation retained its effect on the timing of mitosis. There was no direct evidence that the added HKG was absorbed into the cytoplasm undegraded, although once absorbed it would presumably reach the nucleus in a manner similar to that of endogenous HKG. These results, in conjunction with previous data, support the hypothesis that HKG controls the initiation of mitosis.

2351 INTERACTION OF WALKER 256 MAMMARY CARCINOMA AND FOETAL RAT LIVER IN ORGAN CULTURE INHIBITS ENZYME MATURATION. (Eng.) Farron, F. (New England Deaconess Hosp., Boston, MA 02215); Lightholder, J. R. *Nature* 260(5552): 628-630; 1976.

Cultured rat fetal liver was used to study whether possible endocrine modification of the host by an implanted tumor is an obligatory step in the enzymatic modification of the host liver. Walker 256 mammary carcinomas were placed on sponges covered by the filters that covered the explants, so that the explants were not invaded. The rate of accumulation of tryosine α-ketoglutarate transaminase (TAT) and aspartate aminotransferase (AAT) decreased in the explants by 40% and 25%, respectively, in comparison to that of control explants. The inhibitory effect did not depend on the presence of hydrocortisone in the medium. If mammary tissue from a pregnant dam replaced the tumor, levels of activity for TAT, AAT, and arginase were 10%-20% higher than in controls. The findings suggest that the Walker 256 carcinoma produces a diffusable factor(s) with an inhibitory effect on the rate of accumulation of some enzymes that develop in cultured embryo liver.

2352 KINETICS OF 2-DEOXY-D-GLUCOSE TRANSPORT INTO CULTURED MOUSE NEUROBLASTOMA CELLS.

(Eng.) Walum, E. (Dept. Zoophysiology, Univ. Goeteborg, S-400 33 Goeteborg 33, Sweden); Edstroem, A. *Exp Cell Res* 97(1): 15-22; 1976.

Mouse neuroblastoma cells (C1300, clone Nb41A3) take up 2-deoxy-D-glucose (2-DG) and 3-O-methyl-D-glucose (3-OMG) by a saturable transport process. Experiments with various inhibitors (phloretin, phlorizin, cytochalasin B, ouabain, NaCN and iodoacetate) showed that this process is passive, Na^+-independent, and carrier-mediated. In rapidly growing cultures (20×10^3 cells/cm^2), Km and Vmax for the transport of 2-DG were 0.8 mM and 18.3 nmole/min/mg protein, respectively. An increase in cell density (40×10^3 cells/cm^2) was followed by a drastic drop in the specific uptake, mainly due to a change in Vmax. This inhibition of 2-DG uptake was mainly attributed to changes in the carrier-mediated uptake. In stationary phase culture (120×10^3 cells/cm^2), representing a differentiated state of the cells, Km and Vmax for the transport of 2-DG were 4.9 mM and 9.1 nmole/min/mg protein, respectively. D-Glucose was a competitive inhibitor with a Ki of 3.2 mM. Nonspecific uptake was 35%-50% of total uptake at the cell densities studied. The temperature coefficient for the transport of 2-DG into both rapidly growing and stationary phase cultures was 1.4 (37 C), but the activation energies differed and were found to be 4.6 and 8.9 Kcal/mole, respectively. In several respects, neuroblastoma cells at stationary phase show characteristics of glucose transport similar to those reported for normal cells by others.

2353 DENSITY-DEPENDENT INHIBITION OF 2-DEOXY-D-GLUCOSE UPTAKE INTO GLIOMA AND NEUROBLASTOMA CELLS IN CULTURE.

(Eng.) Edstroem, A. (Dept. Zoophysiology, Univ. Goeteborg, S-400 33 Goeteborg 33, Sweden); Kanje, M.; Walum, E. *Exp Cell Res* 97(1): 6-14; 1976.

The transport of 2-deoxy-D-glucose (2-DG) into cultured human glioma (138 MG) and mouse neuroblastoma (C1300) cells has been studied in relation to the growth curves of the cells. An initial increase in the uptake of 2-DG into exponentially growing 138 MG cells could be attributed to the number of days the cells were kept in culture rather than to their increased density. As the 138 MG cells reached confluency, after 3 days, the 2-DG uptake became density-dependent inhibited. In still denser cultures the cell growth was inhibited. This was accompanied by morphological "normalization" of the cells and increased uptake of 2-DG. Uptake of 2-DG into C1300 cells was density-dependent inhibited throughout the cell growth cycle. As the cell density increased from 15×10^3 to 130×10^3 cells/cm^2, the rate of uptake/cell decreased to one-fourth. At the latter cell density the cells entered the stationary phase, without any major changes in morphology. The results suggest that spontaneously occurring tumor cells, such as glioma and neuroblastoma cells, can regulate the sugar transport in relation to cell density. This could be due to newly acquired differentiated properties of the cells or to true contact-inhibitory phenomena. It is not known if inversional changes in the uptake of glucose occur in the glia and nerve cells during the development of the CNS.

2354 UTERINE ESTROGEN RECEPTOR BINDING OF CATECHOLESTROGENS AND OF ESTETROL (1,3,5(10)-ESTRATRIENE-3,15α,16α,17β-TETROL).

(Eng.) Martucci, C. (Albert Einstein Coll. Medicine, 111 East 210 St., Bronx, NY 10467); Fishman, J. *Steroids* 27(3): 325-333; 1976.

The binding affinities of the catecholestrogen metabolites of estradiol and their methyl ethers for the rat uterine cytosol estrogen receptors were examined. The binding of the fetal estradiol metabolite 15α-hydroxyestriol (estetrol) was also measured. All of the catecholestrogens showed binding affinities far in excess of their uterotrophic potency. This is different from estriol and suggests that the direction of estradiol metabolism may have an important role in the modulation of estrogenic activity of the female sex hormone.

2355 WATER-SOLUBLE METABOLITESOOF THE ESTROGENS. QUANTITATION OF C-18 TETROLS IN RAT FECES.

(Eng.) Elce, J. S. (Dept. Biochemistry, Queen's Univ., Kingston, Ontario, Canada K7L 3N6); Po-Chu Lai, P. *Steroids* 27(3): 335-352; 1976.

Several radioactive estrogens possessing one, two, and three hydroxyl groups were injected po (and, in the case of estrone sulfate, also ip) into adult male hooded rats. The rats were either intact or had ligated or cannulated bile ducts. The two unconjugated estrogen tetrols together represented 21%-87% of the total metabolites in the intact rat. One of the tetrols was 2-hydroxyestriol [estra-1,3,5(10)-triene-2,3,6α,17β-tetrol); the other was possibly estra-1,3,5(10)-triene-2,3,6ξ,17β-tetrol. It is concluded that polyhydroxylated estrogens represent a very large proportion of the previously unidentified water-soluble metabolites of the estrogens in the adult male rat.

2356 DIFFERENCE IN THE NUMBER OF INSULIN BINDING SITES BETWEEN CORTISOL-SENSITIVE AND CORTISOL-RESISTANT LYMPHOMA P1798 CELLS (39291).

(Eng.) Roldan, A. (Mount Sinai Sch. Medicine, 1919

Madison Ave., New York, NY 10035); Stevens, J.; Hollander, V. P. *Proc Soc Exp Biol Med* 151(4): 711-715; 1976.

Cortisol-sensitive and cortisol-resistant lymphoma P1798 cells were found to bind ^{125}I-insulin specifically, with the resistant lymphocytes binding 40% less insulin than the sensitive cells. The binding was unaffected by preincubation with somatotropin, glucagon, and Synacten; it was partially inhibited by pork proinsulin. Results suggest that the resistant cells have a lower concentration of sites per unit surface area, but the reduced binding may also be due to other differences in the cell surfaces. Insulin may play a role in growth regulation and/or response of this tumor to glucocorticoid therapy.

2357 PROLACTIN INHIBITION TEST WITH L-DOPA: DECREASE AND RESTORATION OF PLASMA PROLACTIN LEVELS IN THE RAT BY A PERIPHERAL PROCESS. (Eng.) van der Gugten, A. A. (The Netherlands Cancer Inst., Antoni van Leeuwenhoekhuis, Sarphatistraat 108, Amsterdam, The Netherlands); Sahuleka, P. C.; van Galen, G. H.; Kwa, H. G. *J Endocrinol* 68(3): 369-381; 1976.

Within 30 min after administration of L-DOPA [3-(3,4- dihydroxyphenyl)-L-alanine], plasma prolactin levels (phase 1), were decreased significantly in groups of R-Amsterdam rats differing in age and/or endocrine status, apparently by direct inhibition of prolactin release from the pituitary. Three hours after administration, these low plasma prolactic concentrations had increased (phase 2) and did not differ significantly from levels in control animals, indicating that the effect of L-DOPA is brief. The elimination of rat prolactin from plasma was very high ($t_{\frac{1}{2}}$ = 2.8 min), as indicated by decreasing concentrations of the hormone during phase 1. Pituitary prolactin content did not change during phase 1, suggesting that prolactin synthesis was also stopped. Notwithstanding the high elimination rate, plasma prolactin regained initial concentrations in phase 2, suggesting release of a substantial part of the pituitary prolactin content. The latter, however, remained constant during the whole experiment. The results suggested another working mechanism of L-DOPA in decreasing plasma prolactin levels; namely, by stimulating the uptake of this hormone in the periphery. After the effect of L-DOPA had ceased, most of the prolactin from the periphery returned into the bloodstream, causing a rapid restoration of plasma prolactin levels without substantial release from the pituitary.

2358 PHOSPHORIBOSYLAMINOIMIDAZOLECARBOXAMIDE FORMYLTRANSFERASE ACTIVITIES IN MORRIS HEPATOMAS (Proceedings Abstract). (Eng.) Worzalla, J. F. (Lilly Res. Labs., Eli Lilly and Co., Indianapolis, IN 46206); Sweeney, M. J.; Hodes, M. E. *Proc Am Assoc Cancer Res* 17: 181; 1976.

2359 SUBSTRATE SPECIFICITY OF GLUCURONYLTRANSFERASE OF REUBER H-35 HEPATOMA (Proceedings Abstract). (Eng.) Gessner, T. (Grace Cancer Drug Center, Roswell Park Memorial Inst., Buffalo, NY 14263). *Proc Am Assoc Cancer Res* 17: 118; 1976.

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2362 DEPHOSPHORYLATION OF NUCLEOLAR PHOSPHOPROTEINS BY NUCLEOLAR PHOSPHATASES OF NOVIKOFF HEPATOMA ASCITES CELLS AND NORMAL RAT LIVER (Proceedings Abstract). (Eng.) Olson, M. (Nuclear Protein Lab., Dept. Pharmacology, Baylor Coll. Medicine, Houston, TX 77025); Guetzow, K. *Proc Am Assoc Cancer Res* 17: 14; 1976.

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2366 GSH-PEROXIDASE ACTIVITY OF HUMAN BREAST TISSUE (Proceedings Abstract). (Eng.) Petrakis, N. L. (Hooper Foundation, Univ. California, Sch. Medicine, San Francisco, CA 94143); Doherty, M.; Lee, R.; Mason, L. *Proc Am Assoc Cancer Res* 17: 138; 1976.

2367 ISOLATION AND CHARACTERIZATION OF THE MULTIPLE MOLECULAR FORMS OF CYTOSOLIC GLYCEROL-3-PHOSPHATE DEHYDROGENASE FROM NORMAL AND NEOPLASTIC RABBIT TISSUES (Proceedings Abstract). (Eng.) Ostro, M. (Syracuse Univ., Syracuse, NY 13210); Kornbluth, R.; Fondy, T. *Fed Proc* 35(7): 1656; 1976.

2368 MULTIPLE RNA POLYMERASES OF L1210 MOUSE LEUKEMIA ASCITES CELLS (Proceedings Abstract). (Eng.) Maniglia, C. A. (CMDNJ, New Jersey

Medical Sch., Newark, NJ 07103); Shapiro, H. S.; Wilson, R. G. *Fed Proc* 35(7): 1592; 1976.

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2373 DNA SYNTHESIS IN RELATION TO GROWTH RATE AND PROTEIN SYNTHESIS IN MOUSE CELLS (Proceedings Abstract). (Eng.) Venkatesan, N. (Salk Inst., La Jolla, CA 92037). *Proc Am Assoc Cancer Res* 17: 193; 1976.

2374 EFFECTS OF A STEROIDAL ANTI-INFLAMMATORY AGENT ON DNA SYNTHESIS IN ADULT AND NEWBORN MOUSE EPIDERMIS (Proceedings Abstract). (Eng.) Slaga, T. J. (Fred Hutchinson Cancer Res. Center, Seattle, WA 98104); Yuspa, S. H.; Hennings, H.; Elgjo, K.; Schwarz, J. A.; Viaje, A. *Proc Am Assoc Cancer Res* 17: 39; 1976.

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2377 FIDELITY OF PRERIBOSOMAL RNA SYNTHESIS IN VITRO (Proceedings Abstract). (Eng.) Ballal, N. R. (Dept. Pharmacology, Baylor Coll. Medicine, Houston, TX 77025); Rogachevsky, L. *Proc Am Assoc Cancer Res* 17: 162; 1976.

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2379 CHROMATIN NONHISTONE PROTEIN VARIATIONS DURING NEOPLASTIC PROGRESSION IN MOUSE MAMMARY TISSUES (Proceedings Abstract). (Eng.) McClure, M. E. (Baylor Coll. Medicine, Houston, TX 77025); Medina, D. *Proc Am Assoc Cancer Res* 17: 141; 1976.

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2385 FORMATION OF CYTIDINE 3',5'-MONOPHOSPHATE (CYCLIC CMP) IN EXTRACTS OF LEUKEMIA L-1210 CELLS (Proceedings Abstract). (Eng.) Bloch, A. (Roswell Park Memorial Inst., Buffalo, NY 14263); Leonard, R. J. *Proc Am Assoc Cancer Res* 17: 203; 1976.

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    - REVIEW, 1842*
  - ARYL HYDROCARBON HYDROXYLASES
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  - CHOLANTHRENE, 3-METHYL-
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    - ISOLATION AND CHARACTERIZATION, RAT, LIVER, 1931*
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    - PRECANCEROUS CONDITIONS, 1874
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    - POLYRIBOSOMES, 1967*
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